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MAR 6 - 1933

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

OFFICIAL ORGAN OF THE ROYAL AERO CLUB.

No. 1261
Vol. XXV
No. 8

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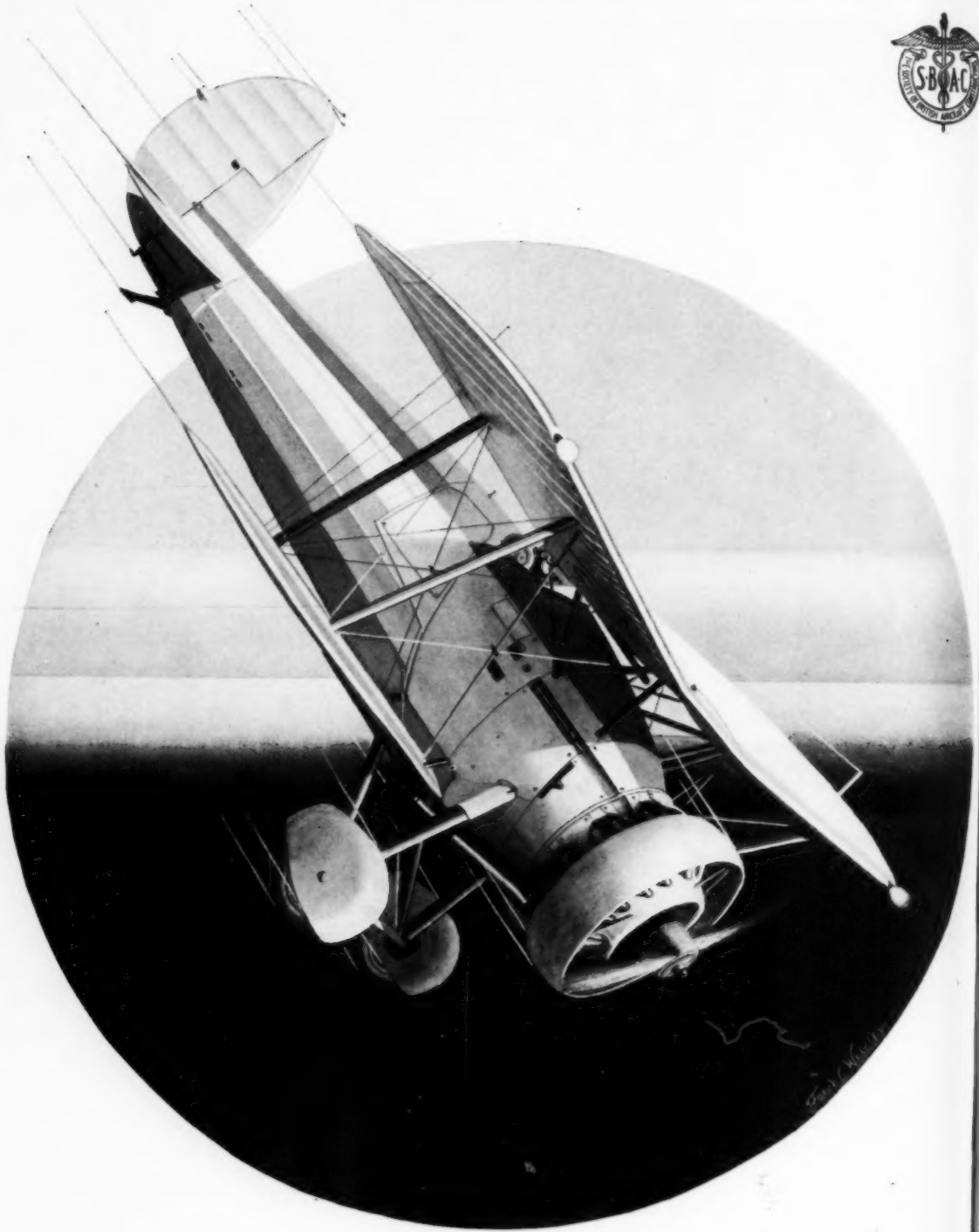

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list:—

1933.
Feb. 25. No. 41 (F.) Sqdn. R.A.F. Reunion Dinner.
Feb. 25. London Aeroplane Club Dance at Stag Lane.
Mar. 3. Leicester Ae.C. Dance at Palais-de-Dance, Leicester.
Mar. 4. No. 55 (F.) Sqdn. R.A.F. Reunion Dinner at R.A.F. Club.
Mar. 4. Services Rugby: R.N. v. The Army, Twickenham 3 p.m.
Mar. 6. Cambridge University Air Sqdn. Dinner, University Arms Hotel, Cambridge.
Mar. 8. "Recent Operations in Kurdistan." Lecture by Group-Capt. A. G. R. Garrod before R.U.S.I.
Mar. 9. "Engine Cooling Research." Lecture by R. McKinnon Wood before R.Ae.S.
Mar. 23. "Seaplane Research," Lecture by H. M. Garner before R.Ae.S.
Mar. 23. "The Value of Aircraft for Protecting Seaborne Trade." Lecture by Air Commodore C. D. M. Robertson, before R.U.S.I.
Mar. 24. No. 1 Sqdn. R.A.F. Reunion Dinner, at R.A.F. Club.
Mar. 24. Bristol and Wessex Ae.C. Dance at Grand Spa Hotel.
Mar. 25. Services Rugby: R.A.F. v. The Army, Twickenham 3 p.m.
Mar. 29. "The East African Dependencies." Lecture by H. F. Melland before R.U.S.I. Chairman, Air Vice-Marshal Sir V. Vyvyan.
Mar. 29. Royal Aero Club Annual General Meeting.
Apr. 1. Women's R.A.F. Dinner, Criterion Restaurant.
Apr. 28 Junior Ae.C. Dinner to S/d. Ldr. Gayford and Flt.-Lt. Nicholetts.
May 10. Kent Air Pageant and Opening of Maidstone Aerodrome.
June 17. Bristol Airport Flying Meeting.
June 24. Royal Air Force Display, Hendon.

INDEX FOR VOL. XXIV.

The 8-page Index for Vol. XXIV of "Flight" and "The Aircraft Engineer," January to December, 1932 (with over 6,463 references for "Flight" and 195 references for "The Aircraft Engineer"—6,658 in all), is now ready and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C.2, price 1s. per copy, net (1s. 1d. post free).

EDITORIAL COMMENT

SIR ERIC GEDDES, Chairman of Imperial Airways, when he returned from South Africa on February 13, as was recorded in FLIGHT last week, told the Press that within the next two or three years Imperial Airways might be running a regular weekly air service across the Atlantic. For the last two years or so the company have been throwing out hints to that effect, though they have, naturally enough, declined to discuss details of how the route could be operated. The *Graf Zeppelin* has shown what airships can do on a regular Atlantic service, and before long we may expect to see the new German airship *Hindenburg* doing still better. We have not entirely forgotten the successful double flight by the R 100. Still, we do not suppose that Imperial Airways contemplate the use of airships. The trouble with aeroplanes, whether landplanes or seaplanes, is that no type has yet been designed which will carry any commercial load in addition to the petrol necessary for the flight. Stops can be made at the Azores and the Bermudas, but even so the stages will be very long.

Commercial Atlantic Flying

Meantime the German Luft Hansa intend to make a cut at this Gordian knot by stationing a refuelling ship in mid-Atlantic, calming the waves with oil, getting a flying boat aboard by means of a trailing apron over the stern, refuelling the machine on board, and then catapulting her off to resume her flight.

As the Zeppelin company have done, the Luft Hansa intend to tackle the South Atlantic, where the distance from Africa to Brazil is roughly 2,000 miles, and to station the fuel ship *Westfalen* somewhere in the middle. This seems a much simpler and more feasible plan than that of erecting Armstrong " seadromes " at intervals across the ocean. Incidentally, we have heard no concrete news of the progress of that scheme for a long time. The trailing apron and the catapult are the two keys to the Luft Hansa scheme. Catapulting off a ship has got well past the experimental stage, and is now regarded as a very ordinary operation. The trailing apron is not a new device, but experiments with it have lately been revived, and are said to have been very successful. With the ship steaming into wind, the apron of canvas or some other fabric is trailed over the stern and helps to create a calm area in the wake, and in this area the seaplane lands. It taxies as far as it can along the yielding surface of the apron, and then is hauled aboard by a crane. This avoids the difficult and risky operation of landing alongside and being hauled aboard from there. In this way the length of the flight is halved, and fuel sufficient for 1,000 miles only need be carried. That leaves a margin for a commercial load, though perhaps not a very heavy one. This Luft Hansa service is to run once a fortnight, on the weeks when the *Graf Zeppelin* is not making a trip. It is hoped that the journey from Berlin *via* Cadiz, Bathurst and Rio to Buenos Aires will be made in only five days. If that schedule can be maintained it will be a truly fine performance. The South American republics cannot but be much impressed if one week they receive mails by a German airship and next week by a German flying boat.

The contrast of this German enterprise with British attention to trans-oceanic commercial flying is not too flattering to the vanity of this country. Since the one successful round trip of R 100 we have abandoned the development of airships, which may be reckoned the first string of trans-oceanic aircraft. The second string is the flying boat. Last year we also abandoned the six-engined Supermarine boat, which might have made a good showing on long-range commercial flying. We were assured that the Air Ministry had to choose between abandoning either this boat or the Boulton & Paul mail-plane, and that as they were persisting with the building of the six-engined Short R.A.F. boat they could more easily dispense with the Supermarine. With this argument we could not altogether disagree. Also we must admit that a flying boat which was too big to be catapulted but not big enough to be able to carry a commercial load from shore to shore would not take us very much nearer to a solution of the trans-Atlantic problem. But there may be other ways of refuelling a large boat half-way across. There is at least a possibility that such a boat might land and taxi on to the apron and be fuelled there without being hoisted aboard. A boat with wing-tip floats would perhaps be less suitable for using the apron than is the Dornier type with its stub stabilisers, but we throw out this suggestion just to indicate that the ingenuity of our designers may find other ways of dealing with the problem than a mere copy of the German plan. We think that experiments ought to be made in this country with the trailing apron, so that we may discover just what is possible with it and what is not.

If the six-engined Supermarine could not be fuelled on the apron or in any other way in mid-Atlantic, then of course she would have been a contribution to the technical development of the flying boat rather than to the solution of any operational problems. This technical advance can, however, now be studied in the Short boat, which has been built for the Royal Air Force, in the same way as it could have been in the civil Supermarine.

The time is coming when we shall have to look on aeronautical advance not so much from the point of view of what we can afford to have, but rather of what we cannot afford to do without. If the Short boat comes up to expectations when she has finished her tests at Felixstowe and begins a series of flights about the Empire, we shall be justified in claiming that we lead the world in the development of flying boats. At the same time, the Germans, if they make a success of their trans-Atlantic venture, will be able to claim that they are in the van of flying-boat operation. The French Aéropostale Company, too, has established itself on the Southern Atlantic service, though they have not yet begun to use aircraft to cross the ocean (some large flying boats are under construction). It is much to be hoped that we do not intend to leave matters as they are. We may find some consolation in the selection of the British port of Bathurst by the Germans as their point of departure for Brazil. The small Colony of Gambia will find itself suddenly an important link in a very important chain; but that is hardly the same thing as securing the air route for British interests.

❖ ❖ ❖ ❖

Empire Air Routes

Sir Eric Geddes, in the interview mentioned above, forecast important developments by Imperial Airways. He seemed confident that during the present summer the Eastern service would be extended from Karachi to Australia. That will be a very great move forward. The question of who will subsidise the section across India cannot yet be answered, but Sir Eric's confidence suggests that the difficulties are not considered insuperable. It also remains to be seen who will actually secure the contract for flying between Singapore and Darwin. The terms of the contract have not yet been published by the Commonwealth Government, and so it would be premature to speculate about the tenders. Naturally, the Australian Government would like to see this section run by an Australian company, and perhaps deductions may be made from the announcement that an Australian company, subsidiary to Imperial Airways, has just been registered.

Sir Eric announced that soon Handley Page 42-seaters would be flying from Cairo as far south as Kenya, where the " Atalantas " would take over the work. Probably some Handley Pages will be withdrawn from the Eastern service to make this possible. The remaining " 42's " on the Eastern run would probably then fly no further than Basra, up to which point the traffic is heaviest, and there, again, machines of the " Atalanta " class would take over. Eight " Atalantas " will obviously not be enough to operate from Kisumu to Capetown and also from Basra to Darwin, so that a further supply will probably be ordered. It is also probable that before long Imperial Airways will be needing some more flying boats.

THE HOUSTON-EVEREST AIR EXPEDITION

SIX members of the Houston Mount Everest expedition left England by air on the morning of Thursday, February 16. Lt. Col. L. V. S. Blacker, the chief observer of the expedition, left Croydon by Imperial Airways for Karachi. Air Commodore and Mrs. Fellowes, the Marquis of Clydesdale, Flt. Lt. D. F. McIntyre, Mr. C. H. Hughes, the engineer, and Mr. Colston Shepherd, special correspondent of *The Times*, left Heston at 9.30 in three small aeroplanes. Lord Clydesdale is the chief pilot of the expedition, and is the squadron leader commanding No. 602 (City of Glasgow) (Bomber) Squadron of the Auxiliary Air Force. The second pilot, Flt. Lt. McIntyre, commands a flight in the same squadron, but he has had the rather unique experience for an A.A.F. officer of having been posted to a regular squadron for a period. In this case the distinction was all the more gratifying because the squadron to which he was attached was the famous No. 12 B.S., which flies "Harts." The sinews of the expedition have been very sportingly provided by Lady Houston, who had previously earned the gratitude of the country by bearing the expenses of the High Speed Flight in the last Schneider contest. Air Commodore Fellowes, who leads the expedition, has had a varied career in the Royal Air Force, but will be best remembered for his work as Director of Airship Development.

Before the start messages wishing good luck to the expedition were received from Lord Londonderry, Secretary of State for Air, and from Lady Houston. The Air Commodore led the flight in a "Puss Moth" lent to the expedition by Messrs. J. S. Fry & Sons, and Mrs. Fellowes travelled with him. Lord Clydesdale piloted a "Fox Moth," in which were Mr. Shepherd and Mr. Hughes. Flt. Lt. McIntyre took the luggage in Lord Clydesdale's "Gipsy III Moth."

The route of the flight will be over France and along the Mediterranean coast to Naples, then across Sicily to Tunisia in North Africa, eastwards to Cairo, Baghdad, Basra, and down the Persian shore of the Persian Gulf to Karachi. There the two Westland aeroplanes which are being sent out by sea will be erected, and the party will then fly on to their base at Purnea in Bihar, which lies at the base of the Himalayas almost due South of Mount Everest—and then, to business!

The three machines arrived safely at Lyons on Thursday afternoon, having stopped en route at Le Bourget. Next morning they proceeded to Sarzana, near Spezia, and the following day, February 18, they reached Naples. From here they flew to Catania on February 19, but were unable to proceed to Tunis next day, as planned, owing to unfavourable weather conditions.

THE HOUSTON-EVEREST FLIGHT: Members of the Expedition set off from Heston on Thursday of last week to fly to Purnea, whence the actual flight over Mount Everest will start. In the group above are, from left to right, Mr. Shepherd, Aviation Correspondent of the "Times," Flt. Lt. McIntyre, Air Com. Fellowes, the Marquis of Clydesdale, and Mr. Hughes, engineer. (FLIGHT *Photo.*)

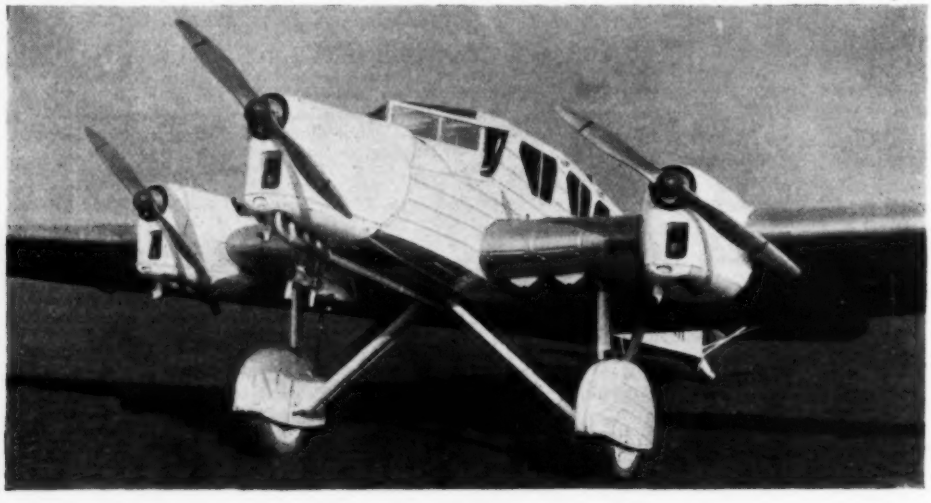
Air Transport

SPARTAN "CRUISER" FOR IRAQ

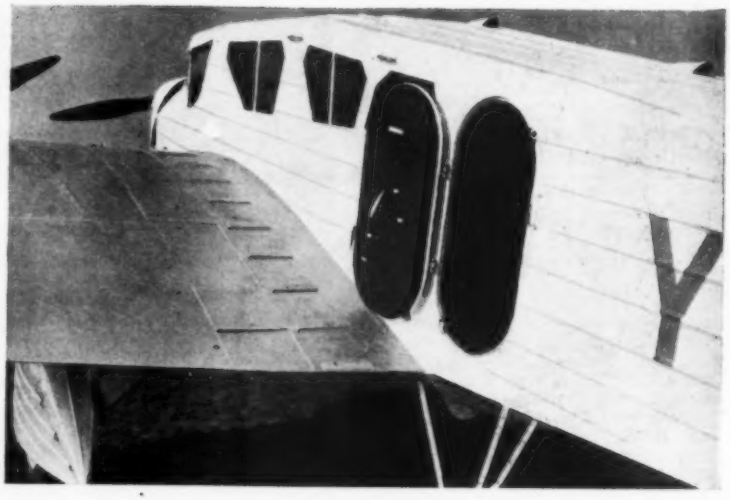
FOR some months Airwork, Ltd., of Heston, have been in negotiation with the government of Iraq for the formation of a national Iraqi aviation company. The company will, it is thought, be incorporated shortly, and in the meantime Airwork, through its associated company Iraq Airwork, Ltd., are sending out a new Spartan "Cruiser" for experimental operation purposes. The machine differs somewhat from the first "Cruiser," modifications having been made to meet the requirements of Airwork, Ltd. The power plant consists of three "Hermes IV" inverted engines of 130 b.h.p. each, additional tankage will give a cruising duration of 8 hr., a Vee type vertical windscreen is fitted to give improved view from the pilot's cockpit, and lockers have been provided in the wings for emergency rations, water tank, tool kit, cleaning rags, and accumulators for the wireless and lighting system. The performance has been increased by the fitting of the more powerful engines, so that the top speed now is about 140 m.p.h. and the cruising speed about 120 m.p.h. The "Hermes IV" engines are provided with electric inertia starters controlled from the pilot's cockpit.

In the first "Cruiser" access to the cabin was through a hatch in the cabin roof. The machine which is going to Iraq, piloted by Capt. Neville Stack, has a door in the port side, behind the wing, so that it is now very much easier to get in and out.

A flight in the "Cruiser" reveals that she provides a particularly pleasing form of air travel. She is quiet, for although the Fairey metal airscrews seem to make a greater noise than wooden or four-bladed airscrews do, yet the "Hermes IV" engines are extremely smooth and powerful without being noisy. The cabin is very well upholstered indeed and the seats provide a degree of comfort comparable in every way to what one now expects in the best class of saloon car. The two forward seats in the passengers' cabin, which face aft, probably provide one with the best view, for there one looks out over the trailing edge of the wing and is also enabled to see forward by slightly turning the head. The two rear seats are however nearly as good, but of course the wing engines restrict the view to a certain extent. The day of our flight was a bitterly cold one, but we found that the heating arrangement in the cabin was exceptionally efficient, so that the cabin was well warmed and at the same time kept from being stuffy by the ventilators. It seemed rather a pity that the cabin windows were not made to open, and we wonder whether the cellon used will not discolour rather rapidly in the climate to be found in Iraq. In the pilot's cockpit the new wind screen arrangement is certainly far better than that of the previous "Cruiser." Rain and snow is shot off the vertical Vee shaped panes from which the pilot looks, and this formation also prevents any draught coming in when one-half of the window is slid



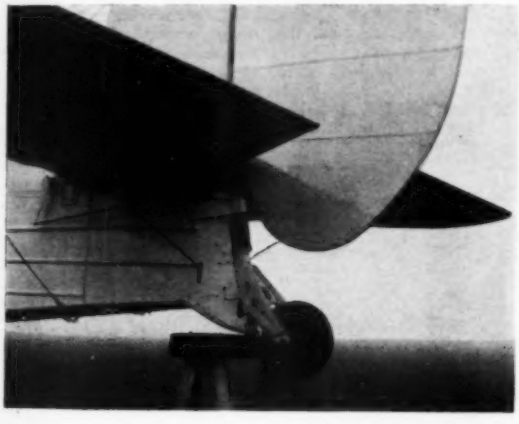
THE IRAQI VERSION: The Spartan "Cruiser" (3 "Hermes IV") has been somewhat modified for work in the Near East. Note the Vee type windscreen. (FLIGHT *Photo.*)



EASIER ACCESS : A cabin door has been fitted in the side of the fuselage of the Spartan "Cruiser."
(FLIGHT *Photo.*)

open. The starboard, or wireless operator's seat, is rather more draughty than we like, owing to the slipstream coming in through the permanently opened portion at the side ; this, however, could be obviated by a very small wind shoot.

The Marconi A.D.6 wireless set fits in nicely in front of this seat, and does not take up an undue amount of room. The new design of cabin top has improved the air flow to the rudder, with the result that it is now possible to fly the machine "feet off" with either wing engine switched off, a slight wing down attitude towards the engine running being all that is necessary. The adjustable tail plane appeared efficient, allowing the machine to be trimmed so that it could, despite the bumpy weather, be flown to all intents and purposes "hands off." Landing is particularly good on this machine. Naturally with its loading the gliding speed is fairly high, but the ground angle is large and the aircraft has the advantage that all speed is lost very rapidly on touching the ground. Thus even without using the Palmer brakes the run is shorter than many other commonly used aircraft.



FOR EASY MANŒVRING ON THE GROUND : The castoring tail wheel on the Spartan "Cruiser."

The undercarriage is of the divided type, and "spats" are fitted over the Palmer wheels. Shock absorption is by Dowty telescopic legs, a feature of which, it will be remembered, is that although the coil springs are placed end to end, they work in parallel. The result of this arrangement is that a tube of quite small diameter will contain the springs, so that the frontal area of the leg is small. On the "Cruiser" a further reduction in drag is achieved by using a streamline fairing over the telescopic tube, above the "spat."

For the very comfortable cabin equipment, such as armchairs and folding table, L. A. Rumbold, Ltd., are responsible.

Capt. Stack is flying the "Cruiser" out to Iraq with Capt. D. Cummings as second pilot, and will make a short stay at Cairo for the purpose of giving demonstrations. Later he will proceed to Iraq, where the machine will be put into experimental operation on a service connecting Baghdad-Khanaqin-Kirkuk-Mosul. It is expected that Iraq Airwork, Ltd., will begin full operations early in March, and further machines of the "Cruiser" type will be available for aircraft charter.

It is understood that three more of these aircraft will be sent to Iraq as soon as Capt. Stack decides that they are required.

The "Cruiser" is rapidly creating a name for itself, and soon several lines will be using the type. In this country the new line to Cowes from Heston, to be opened on April 1 by Spartan Air Lines, Ltd., will use a version having 6 or 8 seats, and it is rumoured that a similar version may soon be operating in Eastern Europe.

Portsmouth Airport

SEASONS affect air transport just as they do most other businesses and the winter is generally a slack time for most firms connected with air transport. The more general use of closed and heated cabin aircraft has, however, tended to stabilise the traffic, so we are not surprised to learn that the Portsmouth, Southsea & Isle of Wight Aviation Co. still find a demand for their ferry service to Ryde, Shanklin and Shoreham, from Portsmouth. They started in the right way by using, on this service, modern comfortable machines like the "Monospar" (two "Pobjoys") and the Westland "Wessex" (three 7-cylinder "Genets"), with the result that people now know that when flying with the company they will be warm and comfortable whatever the weather. The demand has, of course, fallen off as compared with that during the summer, but there is evidence that the service is wanted so it is being kept running, albeit in a skeleton form.

The firm are doing a fairly steady business in flying instruction and should do a great deal more as soon as the clubhouse is finished for the club which is to be formed. An old cottage has been converted, redecorated and furnished so as to be suitable for the purpose and, situated as it is on the edge of the aerodrome with a small garden of its own, it should form a great attraction to the large number of members who have already signified their intention of joining. It is understood that negotiations are in progress to make Portsmouth the Southern Headquarters of the Royal Naval Flying Club.

Galway—Dublin Air Service

LAST week the Galway Harbour Commissioners met Mr. O. E. Armstrong, representing a recently-formed company, to discuss the possibilities of an air line to operate regularly between Galway and Dublin. Mr. Armstrong requested the Commissioners to grant the use of part of the old military aerodrome at Oranmore, six miles from the city, and the provision of housing facilities. Mr. T. J. W. Kenny, Chairman of the Commissioners, pointed out that there might be some difficulty over the obtaining of the land, as the aerodrome was under the control of the Department of Defence, but vested temporarily in the Irish Land Commission, while the Minister for Industry and Commerce was in charge of civil aviation ; in these circumstances, he remarked, it was rather hard to know where the Commissioners stood. It was finally decided that a deputation should meet the Minister for Defence with Mr. Armstrong with a view to obtaining a lease for the use of the ground as an aerodrome. Mr. Armstrong is an ex-R.A.F. pilot and was for some time chief pilot of Iona National Airways, Dublin, which he left in order to become private pilot to Lord de Ramsey

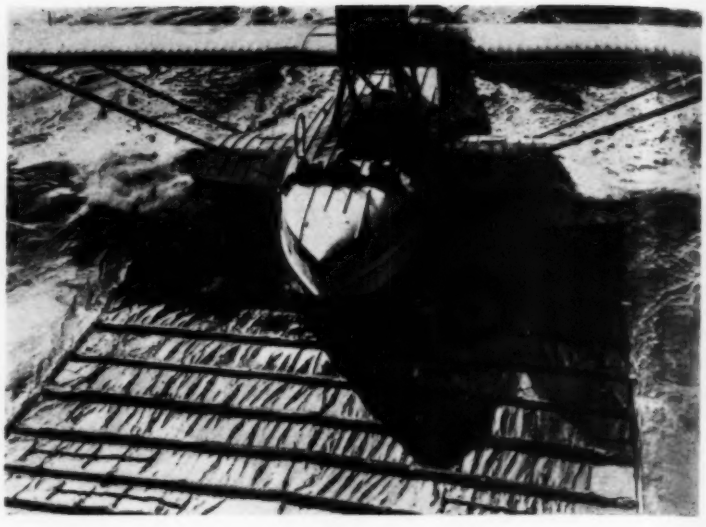
BERLIN—BUENOS AIRES IN 5 DAYS

THE Deutsche Luft Hansa have decided that action is better than speculation. Other nations may talk glibly and prophesy widely about regular air services across the Atlantic, but our friends across the North Sea realise that the old tag of "first come, first served" applies to commerce as much as it does to any other subject. Berlin to Buenos Aires in 5 days is what the Deutsche Luft Hansa mean to achieve, and none of your fast mail boats across the ocean; the whole service will be by air.

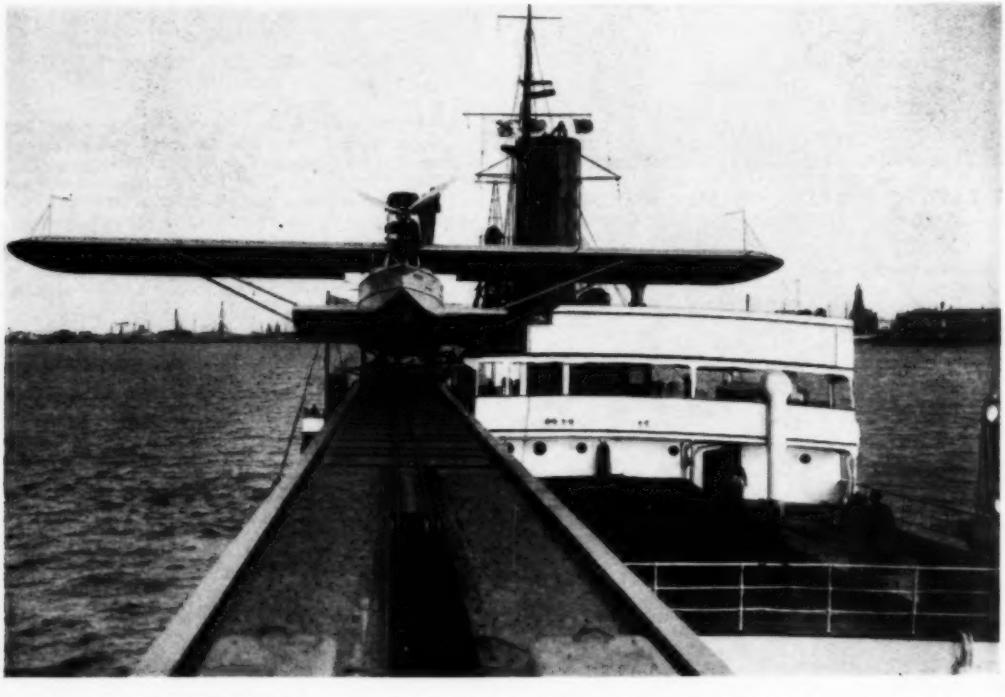
To begin with, the carrying of mails will be the primary object. Starting from Berlin, fast landplanes will operate over the 1,500 miles to Cadiz, and from there to Bathurst in Gambia, a distance of 1,900 miles, flying-boats will be utilised. The South Atlantic crossing of 1,800 miles will also be made in flying-boats, but they will refuel halfway across from a converted liner. The liner to be so used is the *Westfalen*, a Norddeutschen Lloyd steamer of 5,000 tons, which has been chartered by the Luft Hansa to serve as a floating air station. The *Westfalen* will tow a canvas apron on to which the flying-boat will be taxied, and from it be lifted by crane on to the ship. When it has been refuelled the flying-boat will then be launched once more on its journey by means of a Heinkel catapult and a small trolley mounting run on rails. On reaching Pernambuco the mails will be taken over by the Condor Syndicate, which is a subsidiary company of the Deutsche Luft Hansa, and flown to Rio, a distance of 1,200 miles, and on to Buenos Aires, a further 1,300 miles.

Of course, the success of the whole service depends on the effectiveness of the mid-ocean refuelling station. The Luft Hansa have expressed the opinion that only rarely will the weather be so bad as to interfere with the regularity of the mail service. Oil will be thrown out from the *Westfalen* to quell the tossing waves, while the canvas apron being dragged over the surface will also assist in providing a smooth path on which the flying-boat may alight. The flying-boats to be used will probably be Dornier "Wals" fitted with two B.M.W. VII engines, the same type of machine which Von Gronau used for his world flight.

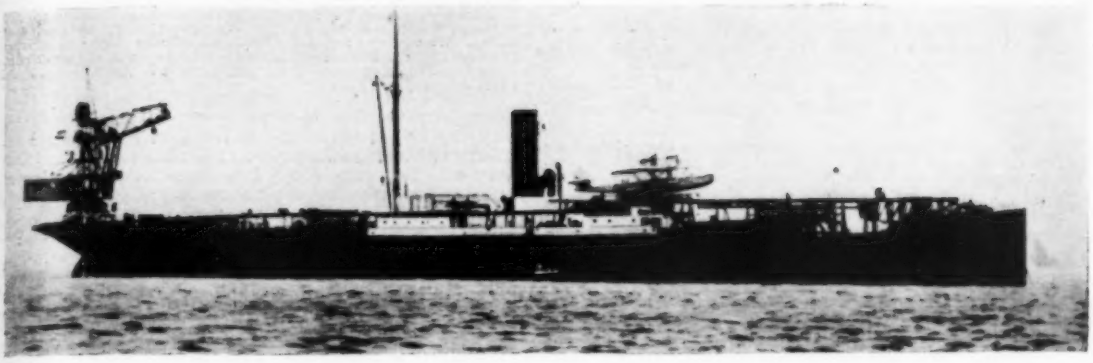
Berlin to Buenos Aires, a distance of about 7,700 miles, in 5 days is an ambitious venture, but "nothing venture nothing win," and, given the necessary organisation,



AN APRON FOR DIRTY WEATHER?: The Dornier "Wal" being drawn up on the landing apron to the stern of the *Westfalen*.



ON THE CATAPULT: Here the Dornier "Wal" is seen on the *Westfalen's* catapult, ready for launching.



THE "MID-ATLANTIC AIR STATION": The Luft Hansa s.s. *Westfalen*, showing the Dornier "Wal" on its catapult, and the hoisting crane.

reliable engines and good pilots, there is no reason why the service should not be a success, and, further, an object lesson to other nations, especially one which has boasted the proud title "Mistress of the Waves." The one drawback which will present itself to every thinking brain is the difficulty which the pilots will experience in finding the *Westfalen*, but in these days of direction-finding wireless and robot pilots this difficulty should be easily overcome.

The service will be operated once a fortnight so as not to interfere with the fortnightly flights of the *Graf Zeppelin*, so our friends in Germany will be operating a weekly air service across to South America, at the same time providing an admirable comparison between airship utility and flying-boat utility.

AIR DISARMAMENT COMMISSION

Speech by Lord Londonderry

AT a meeting of the Air Commission of the Disarmament Conference at Geneva on Monday, February 20, the Marquess of Londonderry, British Secretary of State for Air, made a speech in which he defined the attitude of the British Government.

After reading the resolution of Dr. Benes in July last, which the Conference had adopted, Lord Londonderry quoted from the statement of Sir John Simon in the Bureau on November 17, 1932, in which he said that "the Government of the United Kingdom have already stated that they would be prepared to go to any length, in agreement with other Powers, to achieve this object (*i.e.*, preserving the civilian population from air bombardment)." Lord Londonderry assured the Committee that "the United Kingdom Government are prepared to subscribe to universal acceptance of the abolition of naval and military aircraft and of air bombing, except for police purposes, provided only that there can be devised an effective scheme for the international control of civil aviation which will prevent all possibility of the misuse of civil aircraft for military purposes." Lord Londonderry suggested that the Committee should bend their fullest energies towards producing an effective scheme—effective in the fullest sense—for international control of civil aircraft, "since only on this condition could the Government I represent accept the abolition of naval and military machines and of bombing from the air as set out in the British declaration of November 17—for the danger to the world's peace would otherwise in our judgment be increased rather than diminished."

The Air Minister continued:—"In the view of my delegation any such scheme must satisfy at least the following conditions:—*In the first place*, it must be so framed as effectively to prevent all possibility of the resources of civil aviation being used for military purposes in the event of an outbreak of hostilities.

"*In the second place*, it must not prevent or hamper the fullest development of aviation in every country for civil and commercial purposes, nor must it restrict freedom in the realm of experiment and research."

"It is equally impracticable," he added, "for us to set our hands to any document which would prevent our countries from establishing, in response to their respective needs, fresh channels of communication, either internal or between constituent parts of a nation whose territories are widely dispersed over the surface of the globe, such as the present day sees developing in every direction."

"It is obvious," continued the Air Minister, "that the establishment of any system of international control which complies with the conditions that I have laid down above, raises a number of very difficult questions. I will not attempt in a preliminary statement of this kind to propound all these questions, but I will venture to indicate some of the more important:—

(i) What are the conditions to be satisfied to prevent the misuse of civil aircraft for warlike purposes—remembering that, as I have already pointed out, if military and naval air forces are abolished, not only large air liners but also any civil aircraft, virtually without modification, could be used for the purpose of attack on large centres of population?

(ii) What measures can be taken to prevent the seizure of civil aircraft within its borders by a State which in defiance of the Covenant of the League, the Kellogg Pact, and other Pacts, has determined on an active aggression or a resort to war?

(iii) Does international control to be effective necessitate international ownership?

(iv) If so, how is the principle of international ownership to be applied?

(v) If, as is presumably the case, it is to apply only to international companies, how is effective control to be established over internal air lines and over the daily increasing number of aircraft privately owned, whether for commercial or sporting purposes?

(vi) Would an acceptable system of international control involve some regulation of the question of subsidies?

(vii) Is it possible or desirable to impose any numerical limitation on the civil aircraft of any individual State?

I will not detain the Committee longer, since I trust that I have by now made the attitude of the country I have the honour to represent sufficiently clear. I have explained the conditions on which the United Kingdom is prepared to subscribe to universal acceptance of the abolition of air forces and of bombing from the air, and I have propounded some of the questions which, in our view, demand solution by the Committee. I have done so with every desire to avoid raising unnecessary difficulties and to encourage the examination without prejudice of the most effective scheme of international control. We must, however, realise the difficulties involved and face them from the first.

After the British Air Minister had spoken, Mr. Hugh Gibson (United States) announced that his country could not accept international control of civil flying.

The Germans also were generally opposed to it, arguing that as they were forbidden to build military and naval aircraft they must be free on the civil side.

M. Cot (France) suggested internationalisation of civil aircraft and the establishment of an international police force. He was supported by the delegates of Belgium, Sweden, Norway, Czechoslovakia and Yugoslavia.

The Italian delegate said that the total suppression of military flying was impossible, but that it might be limited. He proposed the abolition of bombing aircraft.

F.B.I. Protest

The Federation of British Industries has addressed a letter to the Prime Minister taking strong objection to the idea of internationalising civil flying. Such a step, it states, will endanger the free development of Empire air routes under British auspices, which is of the highest importance to the Empire.

FLIGHT desires to offer its humble congratulations to Lord Londonderry on the admirable way in which he has dissected and analysed this problem. He has made it clear that it is useless to consider the abolition of Air Forces unless really effective steps can be taken to prevent the use of civil aircraft for warlike purposes, and that Great Britain is not prepared to sign any agreement which did not provide really effective steps to prevent such "misuse" of civil aircraft. Great Britain also is not prepared to agree to the abolition of Air Forces used for "police" purposes. Great Britain also is not prepared to sign any agreement which would limit the progress of civil flying and the research connected with it, or which would prevent her from developing civil air lines according to the needs of the British Empire. Everything depends, therefore on the Committee being able to find a plan which will really and effectively prevent the misuse of civil aircraft for warlike purposes without in any way hampering the development of civil flying.

It is possible that the Committee may be able to devise such a scheme. Lord Londonderry made no suggestions as to how it can be done, and we admit that to us it appears impossible. In fact, we believe that Lord Londonderry's reduction of the problem to commonsense elements has rung the knell of these well-meant but fatuous suggestions for disbanding Air Forces. We hope that the League of Nations will now confine its attention to the more profitable task of prohibiting the use of gasbombs and of deliberate attacks on civil populations. Even partial success in that direction is well worth achieving.—ED.

Meanwhile——

In the United States the Government have just placed a large order for new aircraft. The Glen Martin Company has received an order for 38 long-range bombers for a total sum of $2,000,000, and the Boeing Company have received an order for 111 fighters at a cost of $1,750,000.

In Peking it is expected that Japanese aeroplanes will bomb the military establishments and aerodromes.

The *Echo de Paris* asserts that Italy has recently supplied Hungary with 12 450-h.p. Fiat bombers and 20 650-h.p. Fiat fighters, these being a consignment of a total of 48 which Italy is to supply to Hungary in defiance, it is alleged, of treaties. This statement has not been officially confirmed or denied.

Airport News

FROM HESTON

AN idea of the activity at Heston is shown by the list of visiting machines for Sunday, February 12:—12 "Puss Moths," 11 "Moths," one Avro "Cadet," two "Avians," two Spartans, one Klemm, one "Fox Moth," and one Desoutter.

On Monday, February 13, Banco left to fulfil a charter to Pau, in the South of France.

On Tuesday, February 14, two new pupils joined the School. Mr. Brie left with an "Autogiro" for Biarritz. The three-engined ("Hermes") Spartan "Cruiser," for service at Baghdad, arrived from Cowes. The registration is YI-AAA, being the first machine to be registered in Iraq. Banco's "Puss Moth" arrived back from Pau.

On Wednesday, February 15, Capt. Andrews left in "Bluebird" G-AATS for Speke, where we understand he is taking up the appointment of aerodrome manager. Mr. P. Randolph, of the Household Brigade Flying Club, qualified for his "A" licence.

Thursday, February 16, fortunately, was a fine day, as activity commenced very early in the morning. The members of the Mount Everest expedition made their departure at 9.30 a.m. in three planes—Flt. Lt. McIntyre in G-ABZK ("Tiger Moth"), Air Commodore Fellowes, with wife, in "Puss Moth" G-ABWZ, and Lord Clydesdale in "Fox Moth" G-ACCS with two passengers. There was a large gathering present to wish them *bon voyage*. Mr. E. Brett, with one passenger, left for Paris in a "Puss Moth" *en route* for Cannes. Mr. Elmslie left in a "Puss Moth" for Paris, returning later with Princess Bibesco as passenger. One machine cleared Customs for Jersey.

Friday, February 17, was a quieter day for the School, but several members of the Household Brigade Flying Club put in a considerable amount of flying, Mr. D. S. Wedderburn, of the Scots Guards, qualifying for his "A" licence.

ROUMANIAN MINISTER; Taher Pascha (a Director and Vice-President of Misr-Airwork); Prince Bibesco, President of F.A.I.; Mr. Alan Muntz and Mr. H. N. St. V. Norman on steps of Clubhouse at Almaza (Cairo).

Early on Saturday morning, February 18, Mon. Georges Averseng left Heston for his home in Algeria in a new Comper "Swift" ("Pobjoy" engine), G-ACDT. He has also ordered from them a "Swift" with "Gipsy" engine. Capt. Stack and Capt. Cummings turned up in their new uniforms of the Iraq Airwork, Ltd., which looked exceedingly smart and workmanlike. During the afternoon Capt. Stack demonstrated the new Spartan "Cruiser," YI-AAA. The machine will be flown by him to Cairo, where it will be demonstrated. Later it will proceed to Iraq for use on the experimental air service connecting Baghdad-Khanaqin-Kirkuk-Mosul. Among the many machines flying round during the afternoon was a most unusual one—the Clark "Cheetah" (G-ABOH).

Leicester Airport

LEICESTER City Council have approved the scheme for the completion of the municipal aerodrome at Braunstone, at an estimated cost of £13,400. The management of the aerodrome will be in the hands of the Leicester Aero Club, who will be paid £200 a year by the Corporation. A pavilion is also to be erected for the use of club members, which will cost the club a yearly rent of 6 per cent.

of the cost, not exceeding £240 a year. This new aerodrome is only 3½ miles from the centre of the city, and will be clear of smoke and fog on account of prevailing winds. Leicester claim that owing to their central position the airport may become the most important in the centre of England and one of the most important in the Kingdom. Therefore, there should be no delay in its development. The most favoured contract for the work was put forward by the En-Tout-Cas Company at Leicester.

An Airport for Belfast

FOLLOWING the recent visit of Col. the Master of Sempill to Belfast, when he advocated the use of a site on the shores of Belfast Lough for use as a civil aerodrome (in preference to the R.A.F. aerodrome at Aldergrove, which is some considerable distance from the city), the Harbour Commissioners have again decided to take the matter up. Certain works with regard to the site, that were suggested by the Master of Sempill, are to be undertaken by the Commissioners immediately, and the Chairman, Mr. R. E. Herdman, said that his Board were prepared, should any organisation desire to use the site as a landing ground, to permit the use of the land at a nominal cost for one or two years, in order that it might be ascertained whether or not the Board would be justified in incurring a further expenditure in establishing a civil airport for the city of Belfast. It will be recalled that a year or two ago an offer to establish an aerodrome on the same site by National Flying Services, Ltd., was rejected on account of the expenditure.

An Aid to Touring

PRIVATE flying has consistently received very great benefit indeed from the outstanding efficiency with which the Aviation Department of the Automobile Association is run. Mr. Ivor McClure, who is in charge of it, certainly seems to have a flair not only for realising the way in which people can be helped, but also in carrying out his ideas in the most practical manner. In FLIGHT for October 6, 1932, we described the A.A. Register of Landing Grounds, which is undoubtedly a most useful adjunct to the air pilot, inasmuch as it provides details of landing grounds which are inspected periodically by the A.A., and which are usually situated in places where there is no recognised aerodrome. Such grounds are therefore of particular use to those wishing to pay visits to parts of the country where the more official sort of facilities do not exist. The register has recently had some ten more schedules added to it, bringing the total number up to 35. These schedules are now printed on a different paper, which is considered an improvement, and subscribers to the register may have all their schedules exchanged free of charge if they send their old ones to the Association. The following is a list of the schedules at present incorporated:—Oxon: Banbury (Hanwell). Somerset: Bath (Lansdowne), Frome, Taunton (Haydon). Bedfordshire: Bedford (Kempston), Dunstable. Dorset: Blandford. Hants: Christchurch. Gloucester: Cirencester. Essex: Clacton. Northants: Daventry (Newnham), Peterborough. Kent: Deal. Sussex: Eastbourne, "Wispers" (Midhurst). Pembroke: Haverford West. Cornwall: Hayle (Polkinghorne). Herts: Hitchen. Leicester: Husbands Bosworth (Cote Hill). Lancs: Huyton Hill (Liverpool). Warwick: Kineton, Leamington, Rugby. Yorks: Bawtry, Kirby Moorside (Welburn), Leeming Lane, Sheffield. Lancaster and Hereford. Gloucester: Leighterton (Tetbury). Bucks: Loughton (Fenny Stratford). Wigtownshire: Stranraer. Berks: Wallingford. Durham: West Hartlepool. N.B.: Edzell.

"Wispers" is one of the Duchess of Bedford's private aerodromes, and has been included at her own suggestion. Her Grace has also kindly offered to allow the A.A. to include particulars of another of her aerodromes in Scotland. The ground at Eastbourne will meet a much needed requirement, as in the past the A.A. has received many requests for details of landing facilities in this town. There are two grounds shown at Cirencester, but the larger may only be used if previous notice is given, as the field is used for grazing by valuable bloodstock. The ground at Haverfordwest was included, thanks to the good offices of the Mayor of that town, who came personally to London to see the Secretary of The Automobile Association, so that he might have the exact facts to place before the landowners. In view of the developments that are planned for air traffic between the Irish Free State and this country, new landing grounds and aerodromes along the coast of South Wales must be of considerable importance. They may also enable residents to avail themselves of any extensions which may be made to the existing air service between Bristol and Cardiff. The Hereford landing ground is of interest as it opens up to aviators for the first time one of the most beautiful tracts of country in England. Airmen have previously only flown over this part at rare intervals, but are now privileged to become visitors. The grounds at Rugby and Leamington place two important towns on the air map of England, and it is hoped that they may soon be the means of proving to the municipalities of these towns the desirability of establishing facilities for air traffic. Edzell, situated at the base of the Grampian Hills, is in the middle of some of the most beautiful and varied scenery in Scotland. The landing ground is adjacent to, and is owned by, a hotel appointed by the A.A. Lovers of Scotland will welcome the foresight of hotel proprietors who equip their establishments with landing grounds, and thus bring them within easy reach of all who travel by air.

NEW AIRCRAFT AT SUPERMARINES

Amphibian Activity

SUPERMARINES are, at Southampton, building a new amphibian designed so that it can be used for either military or civil purposes. This is a private venture, and the first version will be arranged for military uses. It is a single-engined pusher biplane boat, with a Bristol "Pegasus" engine. Means have been found to retract the undercarriage partially into the wing, thus reducing the drag, and with the fine hull form achieved this boat gives every promise of having a particularly good performance.

A Royal "Viastra"

Work is also proceeding rapidly on the Vickers "Viastra" ordered by the Prince of Wales. This machine externally differs from the standard "Viastra" in that its two "Pegasus" engines will be mounted closer up beneath the wings than before. Inside, the machine will be particularly comfortable and attractive. A special adjustable seat has been designed in the works which folds flat and forms a couch when necessary. Particular measures have been taken for soundproofing the cabin, the lining for this purpose consisting of a mixture of "Hairlok" and "Dry Zero," while balsa wood fireproofed with "Porcello" paint will keep the internal figured wood panelling clear of the walls of the fuselage. Special cabinets and boxes have been arranged as storage in this panelling so as to utilise the room inside the fuselage to the fullest extent.

Particularly interesting are the lockers for the Gregory Quilter parachutes, which will be of the quickly adjustable belt harness type. Luggage will be carried in three compartments, the first in the nose, the second in the front end of the fuselage underneath the pilots' seats, accessible from an external door, and finally in the rear end of the fuselage behind the cabin.

The pilots' cockpit has full dual control and a particularly well equipped instrument board. The Marconi wireless equipment is stowed under the left-hand pilot's seat and is worked by remote controls. Access to the equipment will be through a small door in the front end of the main cabin.

Other Work

Many "Southampton II's" are in for overhaul. Their large hulls denuded of wings and their Napier "Lion" engines fill one side of the erecting shop. Much work is being done on Vickers "Vildebeeste" for the R.A.F.—girls are trained on production methods making the ribs for these machines—and another "Southampton IV" (two Rolls-Royce "Kestrels") is nearing completion. This, as our readers saw on February 9, is a very clean boat and must have a greatly increased performance.

Airisms from the Four Winds

Return of Lady Bailey

LADY BAILEY returned to Lympne aerodrome on February 14 after her unsuccessful attempt to fly to the Cape.

Mr. J. A. Mollison

MR. J. A. MOLLISON, accompanied by the British Ambassador, was received by the Brazilian President, Dr. Getulio Vargas, on February 14. On February 16 he flew to Buenos Aires, where he was accorded an enthusiastic reception.

England-Australia Air Mail

A NEW company called Australian Empire Airways, Ltd., has been registered at Sydney with a capital of £200,000 to carry on the business of an aerial transport company and act as agents for Imperial Airways. The directors include Sir Eric Geddes, chairman of Imperial Airways. It is believed that this development is a preliminary to the tendering for the Singapore-Port Darwin section of the projected England-Australia air mail service.

Air Officer as Detective Chief

COL. EDWARD BROY, whose appointment as chief of the Criminal Investigation Department of the Irish Free State has just been announced, was Secretary to the Department of Civil Aviation (since abolished) and later Adjutant of the Army Air Corps under Col. C. F. Russell.

R.A.F. Officer for the Admiralty

WING COM. B. L. HUSKISSON has joined the Naval Air Division. This is the first time such an appointment has been made since the Fleet Air Arm was formed. Wing Com. Huskisson will enable a very close liaison to be maintained between the N.A.D. and the Air Ministry, and will also be largely concerned with the aircraft equipment of the Fleet Air Arm. He has had much experience of aircraft work at sea, as he joined the R.N.A.S. as a Flt. Sub-Lt. in 1914, serving in the Dunkirk and Dover areas. He was awarded the D.S.C. in 1917 for conspicuous bravery during the previous 18 months. In 1918 he went on special duty to Canada. Since the war he has served in Iraq and Egypt and at Leuchars, Gosport and Mount Batten in this country, all the latter places being in connection with seaplane, Fleet air aircraft or flying boats. In the Fleet Air Arm he was senior R.A.F. officer in both the aircraft carriers, H.M.S. *Hermes* and *Glorious*, and has been on the staff of the Air Officer Commanding the Coastal Area. Last year he completed the Naval Staff Course at Greenwich.

Mails by Glider

A GLIDER, carrying a quantity of mail and piloted by M. Farner, was towed across the Alps from Zurich by a "Puss Moth" piloted by Herr Fretz. The tow line was cast off at a height of 6,000 ft. over Milan, and the glider landed safely. An attempt at a return flight was made, but owing to heavy gales was unsuccessful. An accompanying aeroplane, carrying photographers and journalists, was blown astray and crashed near Croil; the passengers were not seriously hurt.

Junior Aero Club to Dine World's Long Distance Record Holders

SQD. LDR. O. R. GAYFORD and Flt. Lt. G. E. Nicholetts have accepted the invitation of the Junior Aero Club to dinner on April 28. As our readers know, the Junior Aero Club has since its inception extended its hospitality to people who have done something of outstanding merit in aviation, and this dinner will start the new year well in keeping with the precedent set so far.

An Old Timer Back Again

WE are glad to learn that Mr. Handasyde will shortly be with us in aviation again. We understand that he is taking up an appointment with a firm in or near London in the very near future. It will be remembered that Mr. Handasyde was largely responsible for the success achieved with the Desoutter monoplane.

Durability

ANYTHING which tends to increase the life of an aircraft and to extend the time between overhauls is of vital importance not only to the commercial operator, where costs have to be kept down to a minimum, but also to the user of military aircraft, as aircraft undergoing overhauls are useless for the time being. Great increase has been made in the durability in aircraft. It is not surprising, therefore, to learn that the Hawker "Hart" aircraft (R.-R. "Kestrel"), forming the equipment of No. 57 (Bomber) Squadron R.A.F. stationed at Upper Heyford, have now each completed over 600 hr. flying without overhaul or re-conditioning. They are still in excellent condition, and it appears probable that the 1,000 hr. mark will be exceeded before further examination. One of the chief factors helping towards this desirable condition is, of course, the Dope used. In the case of these machines this was Cellon Dope supplied from the Cellon factory at Kingston-on-Thames.

Fatal Crash in Cape Town

Two members of Sir Alan Cobham's "Air Circus," Capt. H. Lawson and Mr. E. Ross, were killed as a result of a crash while stunting over Cape Town on the afternoon of February 17. An eye-witness stated that the machine was doing a "falling leaf," and when it should have straightened out into a dive, it plunged into the ground from a height of a few hundred feet.

Famous Belgian Pilot Killed

Two Fairey "Fireflies" collided at 13,000 ft. over Nivelles on the morning of Wednesday, February 15, resulting in the death of Capt. Van der Linden. The pilot of the other machine, Sgt. Borizewitz, escaped by parachute, but was seriously injured in the jaw and arm. Capt. Van der Linden was one of the most famous pilots in the Belgian army, and recently flew to the Belgian Congo and return.

Breach of A.N.D.

ON February 14, at Doncaster Police Courts, Thomas J. Mammatt and Augustus G. Alderson, directors of the Doncaster Aviation Co., were each fined £50 for breaches of Air Navigation Direction. It was stated that Alderson carried fare-paying passengers when he had no licence, and he carried two passengers in a machine that was only licenced for one. On a second occasion, when he was carrying two passengers, the machine crashed, injuring Alderson and fatally injuring the passengers.

G.E.C. not Air-minded

IN connection with a paragraph published in our Croydon Notes last week to the effect that a flying club had been formed by the G.E.C., we have been asked to state that the directors of the G.E.C. object strongly to the formation of such a club, and that what has happened is that certain individual members of the General Electric Company have made private arrangements between themselves and British Air Transport, Ltd., better known under the initials B.A.T., to form a flying club. The club has no connection with the G.E.C.

The British Gliding Association

COL. THE MASTER OF SEMPILL has been appointed President and Chairman of the British Gliding Association in succession to Lt. Col. F. C. Shelmerdine. Mr. Gordon England has automatically retired as chairman after three years' service in that capacity. Mr. Whidborne has returned as Treasurer. Mr. Claude Graham White is the Hon. Treasurer.

British Hospitals' Air Pageants

AT a meeting of the Committee, held on February 14, the following amended constitution of British Hospitals' Air Pageants was passed:—(1) That from the proceeds of the series of Air Pageants, held under the direction of Air Pageants, Ltd., the first charge should be the liquidation of the offer made to local hospitals, viz.: (*a*) Ten per cent. of the gross gate receipts; (*b*) £30 worth of flight tickets; (*c*) thirty-three and one-third per cent. of programme sales; (*d*) gross profits on sale of model aircraft and books on flying. (2) A direction and management charge of 5 per cent. of the turnover should be paid to Air Pageants, Ltd. (3) The whole of the remaining profits should be carried forward from year to year, and on the winding up of British Hospitals' Air Pageants this fund should be handed over to the British Hospitals Association or its nominees to be distributed as they should deem fit. Messrs. Lord, Foster & Co., chartered accountants, of 37, Walbrook, London, E.C., were appointed auditors. They will carry out an annual audit and prepare a signed balance-sheet for publication at the end of each year's operations.

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

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CEILING CAPACITY AS A MEASURE OF PERFORMANCE

By Clifford W. Tinson, F.R.Ae.S.

(*Concluded from p. 7.*)

The change of speed due to change in density has been plotted in Fig. 5 from the expression :—

$$V_h/V_o = \sqrt{\frac{1 + \sqrt{1 - (\rho_u/\rho_h)^2}}{1 + \sqrt{1 - (\rho_u/\rho_o)^2}}} \quad *$$

with the necessary transformation to give the increase from ceiling downwards.

The increase of revolutions of the propeller on the way down from ceiling, for propellers of one particular make, is represented in Fig. 7. To obtain this, the r.p.m. of the propeller both climbing and full speed level, taken from Official Reports, were plotted against altitude, see Fig. 6. On the assumption that there is but one value of r.p.m. at absolute ceiling, the throttle being fully open to maintain height, these curves are united at the absolute ceiling given in the Report, which point represents unity in Fig. 7, the full speed revs. curve being plotted from this point. The climbing revs. are only plotted to fix the bend at the top of the speed revs. curve, so as to determine the ceiling revs. satisfactorily.

The dotted lines in Fig. 6 are the b.h.p. values against altitude as given by the engine makers, and fall from rated altitude up in accordance with $\frac{1}{2}(\rho/\rho_o + p/p_o)$.

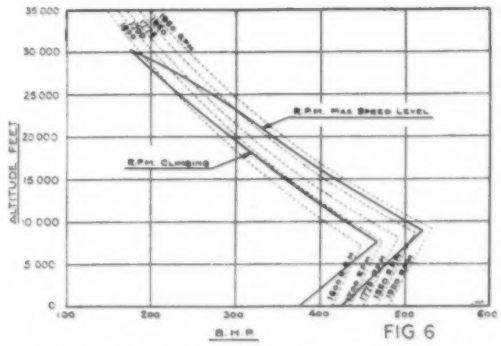


FIG 6

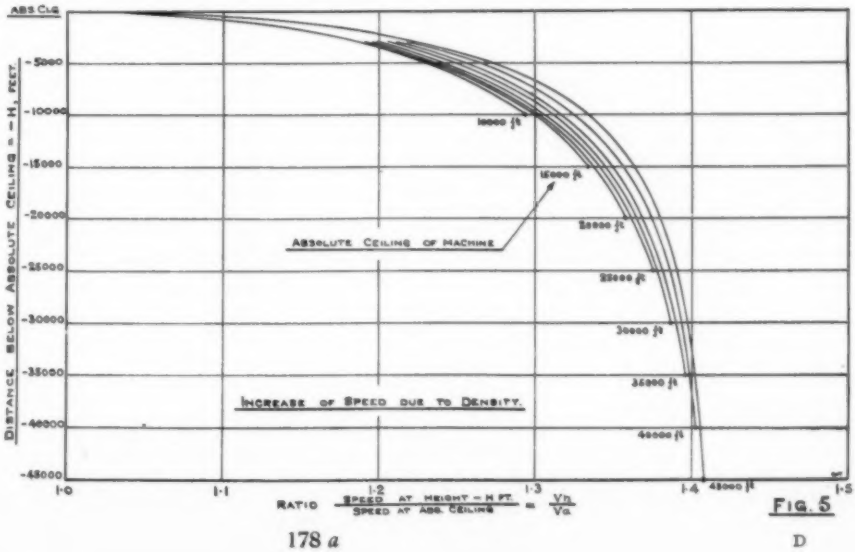


FIG. 5

* "Revue des Revues," L'Aéronautique, December, 1928. "Calcul des Performances," Olichowsky.

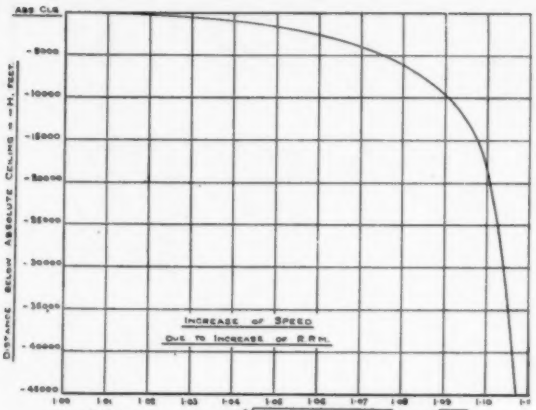


FIG 7 $\sqrt[3]{\frac{\text{REVS AT HEIGHT} = -H \text{ FT}}{\text{REVS AT ABS CEILING}}} = \sqrt[3]{\frac{n_h}{n_0}}$

A number of curves of this kind indicate a fairly consistent increase from ceiling downwards (for this make of propeller) and the cube root of the average of them represents the increase of speed due to increase of revolutions.

The combination of Figs. 5 and 7 gives the total increase of speed from ceiling downwards, shown in Fig. 8.

Turning now to climb, it is necessary to find the slope appropriate to a machine of a certain ceiling capacity. As the rate of climb slope varies slightly with machines having the same ceiling capacity owing to variations in wing loading a series of slopes must be plotted to cover all values of wing loading.

The slope is given by

$$r = \frac{\text{Rate of climb}}{\text{Height below ceiling}} = \frac{Vc}{-H}$$

The height of the absolute ceiling has been given above, and the maximum rate of climb at sea level for naturally aspirated engines is given by

$$Vc = \left(\frac{K_1}{W/P}\right) - (K_2\sqrt{w})$$

and from Vc max to Vc zero is taken as a straight line in such cases. For supercharged engines, however, the slope varies because the rate of climb is no longer straight, and if the lower slope or even the average slope be taken, the time to climb figures at intervals of height remote from sea level will be optimistic. It is less serious if the times are in error near sea level, consequently the slope of the rate of climb curve as it approaches ceiling is taken as the general slope, thus putting the interval times near the ceiling right at the expense of the interval times nearer the ground.

To obtain the desired results, the constants in the rate of climb expression have been suitably modified, and the results plotted in Fig. 9. Here the ceiling capacity is represented generally by the value of $(W/P\sqrt{w})$, whilst the variations brought about by changes in wing loading are shown by the series of curves.

Thus a machine with a ceiling capacity of 25 at a standard wing loading of 10 would have a rate of climb slope near the ceiling of 0.069. Reducing the wing loading to 9 alters the slope to 0.065, and increasing it to 11 alters the slope to 0.072.

The time to climb can be plotted from ceiling downwards for various values of r, and the times read off down to rated altitude, which becomes unity. Then by subtracting the times from this time down to rated altitude, the times upwards are obtained. This process will be clear from the example at the end.

Fig. 10 gives the times downwards from *Service Ceiling* for different values of the slope r. It is more convenient graphically to use service ceiling for the datum level of this graph, as the times above it, if included, would very much reduce the scale of the graph, and such times are of no interest. It is important to remember this and take minus heights $-h$ accordingly. The height of the service ceiling is

$$-h = \frac{100}{r}$$

and the heights and times down are $-h$ and $-t$ respectively. The heights down from *absolute* ceiling for the other curves are $-H$.

Below rated altitude, the performance depends on the shape of the power curve of the engine in question, and must be treated specially, of course; but as the time to rated altitude alone is of interest, this part of the work does not take very long. This time to rated altitude must be added to the times found graphically to give the necessary information for preparing the final chart of performance.

In using Figs. 5, 7, 8 and 10 it is important to remember that the portions of the curves between ceiling and rated altitude only are applicable.

Example.

Data.

Weight of aircraft	3,494 lb.
Area of wings	306 sq. ft.
Power at 9,200 ft.	530 h.p.
$\frac{1}{2}(\rho/\rho_o + p/p_o)$ from Fig. 2 ...	0·73
P_E equivalent ground power ...	726 h.p.
K_L max. (biplane)	0·58
Surface loading w	11·42 lb./sq. ft.
Equiv. power loading W/P_E ...	4·81 lb./h.p.
$(W/P_E\sqrt{w})$	16·27
Stalling speed coeff. K_4, Fig. 3 ...	18·40
Stalling speed V_s ground level ...	62·20 m.p.h.

For the purpose of this example, three values of K_3 will be taken with the object of indicating the order of the difference in results arising from an error of plus or minus three in the estimation of the appropriate value of K_3.

Case	$(W/P_E\sqrt{w})$	K_3	Absolute Ceiling (from Fig. 1)
			ft.
1	16·27	87	29,400
2	16·27	90	30,000
3	16·27	93	30,600

For the three ceilings above, the ceiling speed Va is:

Absolute ceiling	$\sqrt{\rho_o/\rho}$	$Va = 1{\cdot}17\ Vs\sqrt{\rho_o/\rho}$
ft.		m.p.h.
29,400	1·614	117·5
30,000	1·632	118·9
30,600	1·650	120·0

Speeds.

The maximum speed level at the minus heights corre-

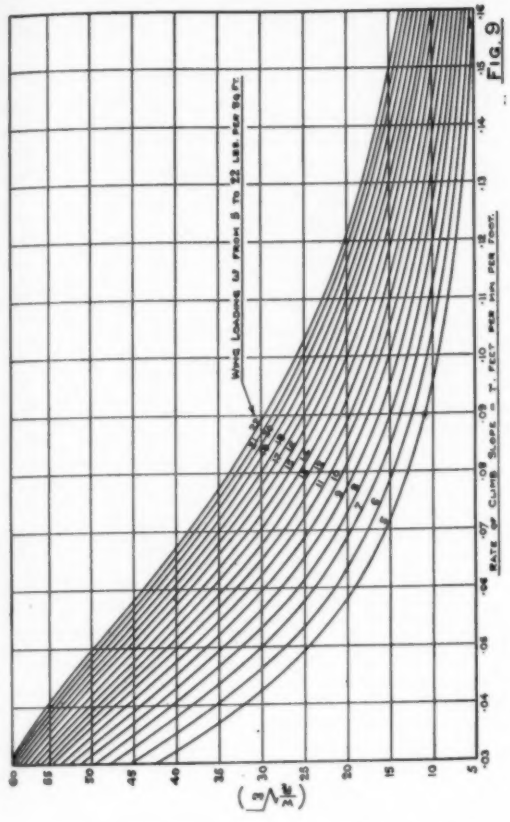


FIG. 9
WING LOADING W FROM 5 TO 22 LBS PER SQ.FT.
RATE OF CLIMB. SLOPE = V. FEET PER MIN. PER FOOT.
(W/S)

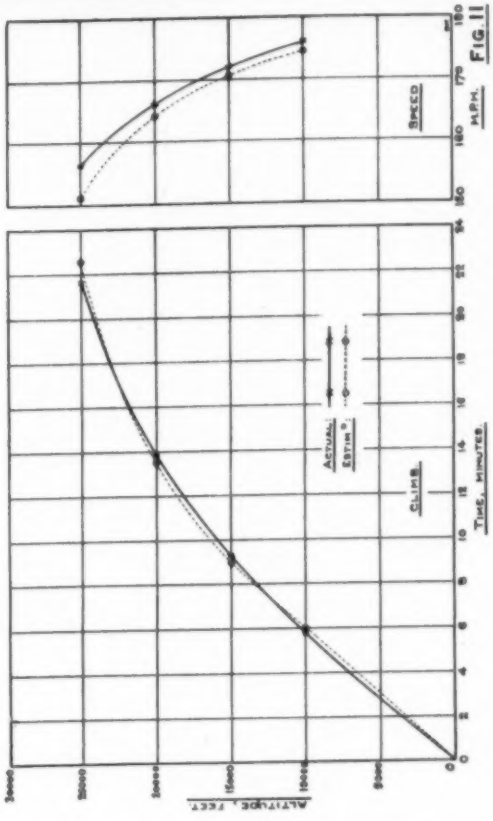


FIG. 11
SPEED
M.P.H.
ACTUAL
ESTIM.
CLIMB.
TIME, MINUTES
ALTITUDE, FEET

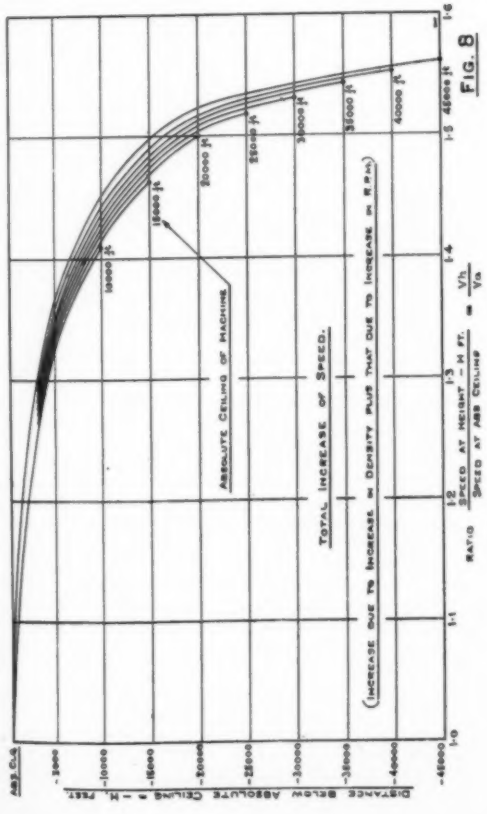


FIG. 8
ABSOLUTE CEILING OF MACHINE
TOTAL INCREASE OF SPEED.
(INCREASE DUE TO INCREASE IN DENSITY PLUS THAT DUE TO INCREASE IN R.P.M.)
RATIO Speed at height = H ft. / Speed at abs ceiling = V/Vo
DISTANCE BELOW ABSOLUTE CEILING = - H. FEET

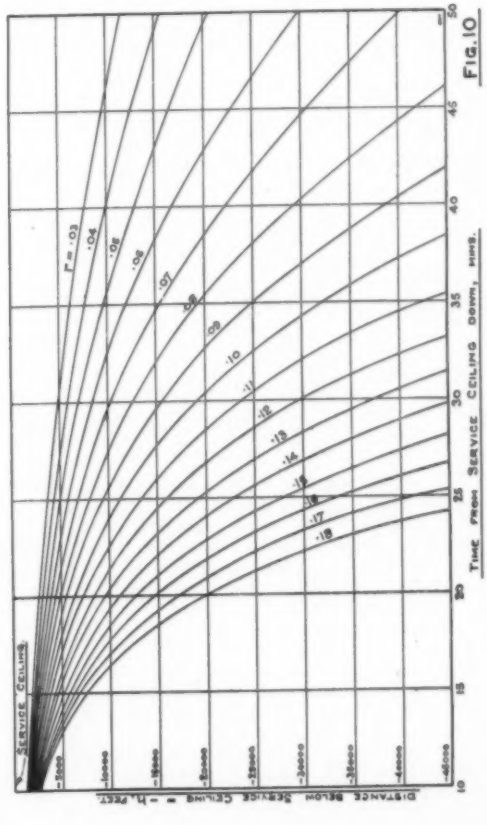


FIG. 10
SERVICE CEILING
TIME FROM SERVICE CEILING DOWN, MINS.
DISTANCE BELOW SERVICE CEILING = - h. FEET

sponding to standard heights of 9,200, 10,000, 15,000, etc., taken from Fig. 8 are as follows:—

Standard Height (ft.)	V max.		
	Case 1	Case 2	Case 3
(Rated Alt.)	m.p.h.	m.p.h.	m.p.h.
9,200	177·5	179·6	181·6
10,000	177·0	179·2	181·1
15,000	173·3	175·8	178·0
20,000	167·5	170·1	172·5
25,000	156·0	159·8	163·0

Assuming that Case 2 ultimately proved the correct one, it will be seen that the order of accuracy obtainable is a little over 1 per cent. for a difference of 3 in estimating K_3, or an error of about 600 ft. in estimating the height of the absolute ceiling.

Rate of Climb.

The slope of the rate of climb curve, r, is taken from Fig. 9. For $(W/P_E\sqrt{w} = 16{\cdot}27$ and $w = 11{\cdot}42$, the value of r is 0.1005 ft. per min. per ft.

Service Ceiling.

The service ceiling is $\frac{100}{r} = -995$ ft. Thus, the service ceiling in the three cases is as follows:—

Case	Service Ceiling
	ft.
1	28,405
2	29,005
3	29,605

The times must be taken to minus heights with respect to these three figures.

Time to Climb.

Standard Height (Ft.)	$-h$			$-t$		
	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3
9,200 (rated alt.)	−19,205	−19,805	−20,405	30·00	30·25	30·55
10,000 ,,	−18,405	−19,005	−19,605	29·60	29·9	30·25
15,000 ,,	−13,405	−14,005	−14,605	26·70	27·05	27·45
20,000 ,,	− 8,405	− 9,005	− 9,605	22·20	22·95	23·55
25,000 ,,	− 3,405	− 4,005	− 4,605	14·80	16·10	17·05

The times upward from rated altitude are obtained by making the time against rated altitude unity, and deducting the other times from the time against rated altitude. This gives the figures in the left-hand portion of the next table, to which the time between sea level and rated altitude must be added to complete the table.

In the example here, the average rate of climb between sea level and rated altitude works out at 1,650 ft. per min. Thus, the time up to rated altitude in each case is approximately 6.06 min., to be added.

The total time T then appears in the right-hand portion of the table in the next column.

In this case the order of accuracy obtainable is such that there is a difference of from 30 to 39 sec. to 25,000 ft. for a difference of 3 in estimating the appropriate value of K_4.

Standard Height (Ft.)	t mins.			Time to Rated Altitude	Total Time, T mins.		
	Case 1	Case 2	Case 3		Case 1	Case 2	Case 3
9,200 (rated alt.)	0	0	0	6·06 mins.	6·06	6·06	6·06
10,000 ,,	0·40	0·35	0·30		6·46	6·41	6·36
15,000 ,,	3·30	3·20	3·10		9·36	9·26	9·16
20,000 ,,	7·80	7·30	7·00		13·86	13·36	13·06
25,000 ,,	15·20	14·15	13·50		21·26	20·21	19·56

In conclusion, there is no important difference in the method described in this article, compared to the customary method of using general formulæ for performance estimation, except that the curves represent the performance of aeroplanes fitted with supercharged engines, whereas curves plotted from the basic formulæ without modification apply only to normally aspirated engines.

If the unmodified formulæ be used for predicting the performance of supercharged machines, an error is introduced which is divergent from the ground up, giving the greatest inaccuracies where accuracy is most desirable, *i.e.*, where climb times are double figures.

Also, for the same face values of wing and power loadings, aerodynamic changes cause alterations in all four constants K, K_1, K_2 and K_3, the appropriate values for which are automatically determined by using ceiling capacity in the manner described as the basis.

An example to show the agreement between the estimated figures and the actual is illustrated in Fig. 11. In this, the actual are the average figures from a batch of machines sold abroad, which were tested for acceptance with all external equipment in place. The K_3 was rather lower than usual for the type owing to this.

In this particular case, the average absolute ceiling of the batch was 28,800 ft., and with this information and the wing and power loadings, the figures shown as "estimated" in Fig. 11 have been obtained from the curves reproduced in this article.

The engine was supercharged to 10,000 ft. and gave an average rate of climb to rated altitude of 1,660 ft. per min. Thus, the time to add to those found from Fig. 10 is about 6 min. to give the total time T.

It will be observed that the estimated and actual curves (the latter are "corrected," of course) shown in Fig. 11 are as nearly coincident as can be expected, and it will be agreed no doubt that the climb times high up are much closer to the actual times than would have been the case had the old method been used, which does not allow for the bend in the rate of climb curve.

NOTES ON THE DESIGN OF TWIN SEAPLANE FLOATS.

By H. PARKINSON.

The Schneider Trophy Contests of the last few years have undoubtedly been mainly responsible for the advancement of design in the modern seaplane, and research work on model floats in this connection has given a basis upon which most up-to-date float designs are built.

Once an original successful float design has been obtained by a series of tank tests, any subsequent floats of different displacements to the original may be determined, as is well-known, by the use of a cube law factor. A float designed in this fashion may be found to be quite satisfactory in the original form, but in any case a tank test will show where the necessary modifications in the lines are to be carried out.

The main factor in design work is to have a reliable float form upon which the work in hand may be based.

Use of the information contained in these notes will

effectively cut down most of the preliminary work, and should be found useful in preparing tender drawings, etc.

Nomenclature.

L	Overall length.
B	Maximum beam.
H	Overall Height.
V	Total volume in cubic feet of one float (at 100 per cent. reserve buoyancy V also is equal to the total displacement of the flotation system to L. W. L.).
Δ	All-up weight of aircraft in lb. or total displacement of flotation system to L. W. L.
Δ_T	Total displacement of one float in lb.
K	Block coefficient.
I_T	Transverse moment of inertia of water plane.
I_L	Longitudinal moment of inertia of water plane.
I_{TT}	Total Transverse moment of inertia of flotation system.
I_{LT}	Total longitudinal moment of inertia of flotation system.
C.B.	Centre of buoyancy.
A	Area of water plane.
	Sea water at 64 lb. per cu. ft.

Fig. 1 shows a round-decked float on modern lines with 30 deg. Vee-bottom amidships. All dimensions are given in terms of B.

$B = 1.$ $L = 8{\cdot}1\ B.$ $H = 0{\cdot}875\ B.$ $K = 0{\cdot}47.$

From the foregoing

$$V = 0{\cdot}47 \times B \times 8{\cdot}1\ B \times 0{\cdot}875\ B$$

$$B^3 = \frac{V}{3{\cdot}33} \quad \ldots\ldots\ldots\ldots \quad (1)$$

which may be conveniently expressed

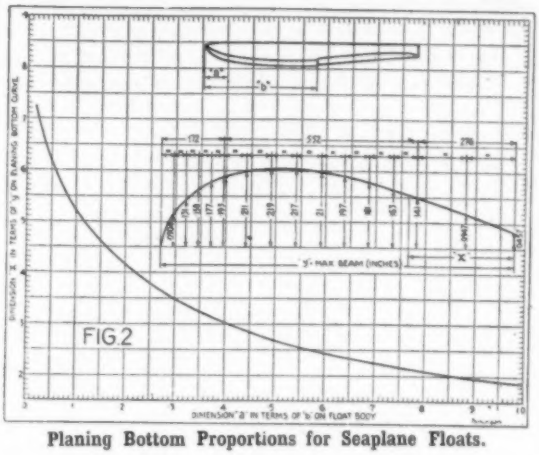
$$3{\cdot}33\ B^3 = \frac{\Delta_T}{64} \qquad B \text{ in ft.} = \sqrt[3]{\frac{\Delta_T}{213}}$$

$$B \text{ in in.} = 2{\cdot}01\ \sqrt[3]{\Delta_T} \quad \ldots\ldots\ldots\ldots \quad (2)$$

It will be seen at this stage that immediately the total buoyancy of the float has been decided upon, it is possible to fix quickly the required beam by use of formula No. (2). The advantage of a basic float with all offsets dimensioned in terms of B is evident.

Laying out of Lines.

Immediately the offsets are computed we can go ahead by laying out the sheer plan and plan. The usual shipyard practice of laying down the lines full size on the shop floor is hardly necessary in the case of so small a hull as the seaplane float. The necessary work can be accomplished quite satisfactorily in the design office by laying down foreshortened views, i.e., a quarter full size fore and aft and full size to a half full size in sheer. The top radius of the deck at any body section may be determined from the usual locus of the top radii centres. The after planing bottom is flat and in view of this a body section at any point may be constructed by directly scaling the chine and keel offsets from the sheer plan and plan.



Planing Bottom Proportions for Seaplane Floats.

The fairing lines of the concave forebody planing bottom may be eliminated by use of Fig. 2. This Figure may be constructed for any particular design of seaplane float or flying boat hull. Included in Fig. 2 is an example of the familiar planing bottom curve, also dimensioned in terms of the maximum beam B.

A numerical example will make the use of this figure clear.

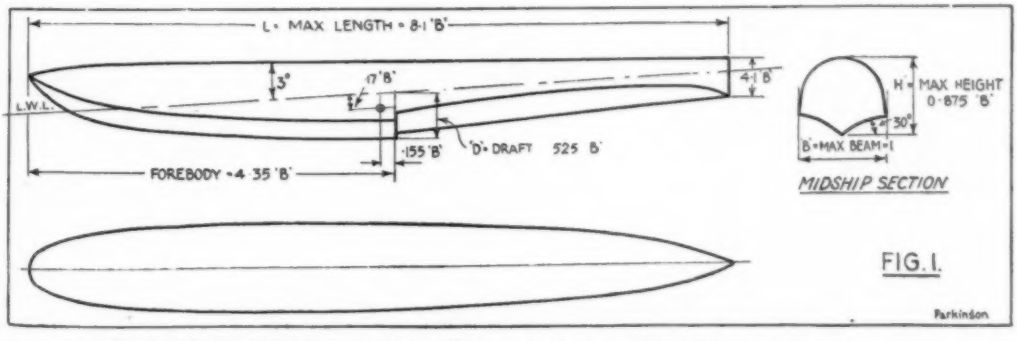
Example.—A planing bottom curve is required for a float of 4,000 lb. total buoyancy, together with the planing bottom shape at a distance of 40 in. from the bow ($a = 40$ in.)

$$B \text{ in in.} = 2{\cdot}01\ \sqrt[3]{4{,}000}$$

$$B = 31{\cdot}9 \text{ in.}$$

$B = y$. All ordinates are in terms of B.

The ordinates can now be computed and the required planing bottom curve drawn out.



BLOCK COEFFICIENT K = 0·47. L.W.L. and C.B. shown for 100 per cent Buoyancy.

Forebody length from Fig. 1 = 4·35 B = 139 in.

$$\frac{a}{b} = \frac{40}{139} = 0{\cdot}288$$

Reading 0·288 from the bottom axis on Fig. 2 shows that x in terms of $y = 0{\cdot}35$.

$$x = 0{\cdot}35\ y = 0{\cdot}35\ B = 11{\cdot}15 \text{ in.}$$

11·15 in. marked off as shown on the planing bottom curve fixes the keel work for this particular body section. This is made clear on Fig. 3.

Centre of Buoyancy and L. W. L.

Fig. 1 shows the position of the L.W.L. and Centre of

Buoyancy on the assumption of a 3 deg. L.W.L. and a reserve buoyancy of 100 per cent.

C.B. = 0·155 B forward of step and 0·17 B below L.W.L.

Draught = 0·525 B measured vertically from keel at step.

Water Plane.

$A = 0{\cdot}7\ LB$

$I_L = 0{\cdot}039\ L^3B$ (about centre of flotation).

$I_T = 0{\cdot}039\ LB^3$ (about centre line of float).

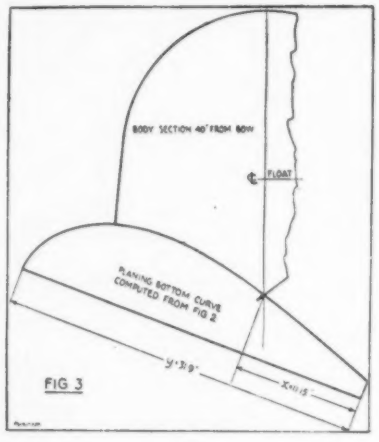


FIG 3

Stability.

Modern United States* and British† seaplanes are designed to have metacentres within the following ranges—

Transverse GM in ft. $= 1\sqrt[3]{\Delta}$ to $1{\cdot}4\sqrt[3]{\Delta}$

Longitudinal GM in ft. $= 1{\cdot}4\sqrt[3]{\Delta}$ to $1{\cdot}8\sqrt[3]{\Delta}$

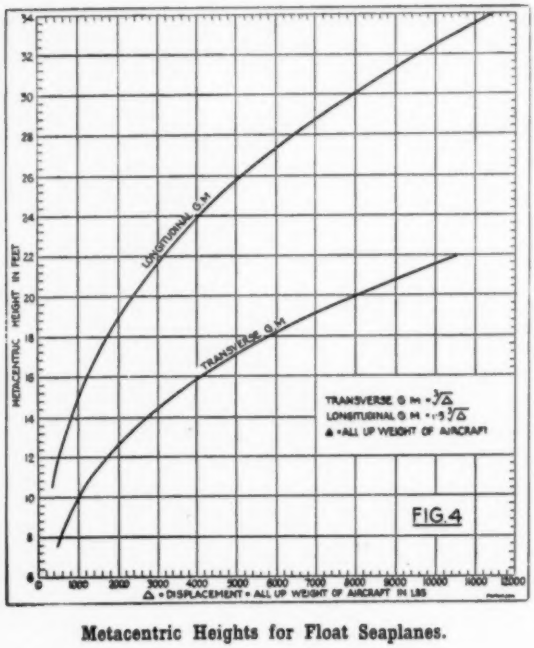

METACENTRIC HEIGHT IN FEET
LONGITUDINAL G M
TRANSVERSE G M
TRANSVERSE G M = $\sqrt[3]{\Delta}$
LONGITUDINAL G M = $1{\cdot}5\sqrt[3]{\Delta}$
Δ = ALL UP WEIGHT OF AIRCRAFT
Δ = DISPLACEMENT = ALL UP WEIGHT OF AIRCRAFT IN LBS

FIG.4

Metacentric Heights for Float Seaplanes.

The following suggested minimum values of G M are plotted on Fig. 4

Transverse GM in ft. $= 1\sqrt[3]{\Delta}$ (biplanes)

Longitudinal GM in ft. $= 1{\cdot}5\sqrt[3]{\Delta}$

* Commander Richardson, U.S.N. † Mr. A. Gouge, A.F.R.Ae.S.

The track of a monoplane seaplane is usually higher than that of an equivalent biplane arrangement, and in view of this the transverse GM of $1{\cdot}4\sqrt[3]{\Delta}$ would appear more suitable in the case of the monoplane seaplane.

On the assumption of a constant percentage reserve of buoyancy and angle of L.W. L., the IL of the waterplane will increase or decrease uniformly according to the size of the float. The longitudinal G M is therefore governed by B G (i.e. distance between C B and C G of aircraft) which in turn is fixed by the desired amount of water clearance with the air-screw and aircraft upper structure.

A float on the lines of Fig. 1 will be found in normal seaplanes, to give a transverse G M well in excess of the value $1{\cdot}5\sqrt[3]{\Delta}$ which is suggested as a minimum.

Track.

Calculations for track can be reduced as follows—

$$I_{TT} = 2\left(A\left(\frac{T}{2}\right)^3\right)$$

$$= 0{\cdot}35\ L\ B\ T^3$$

$$\text{Transverse BM} = \frac{I_{TT}}{V} = \frac{0{\cdot}35LBT^3}{V} = \frac{2{\cdot}84B^3T^3}{V}$$

$$V = 0{\cdot}47 \times B \times 8{\cdot}1B \times 0{\cdot}875\ B = 3{\cdot}33B^3$$

$$\text{Transverse BM} = \frac{2{\cdot}84B^3T^3}{3{\cdot}33B^3} = \frac{0{\cdot}85T^3}{B}$$

$$\text{Track} = \sqrt{\frac{BM \times B}{0{\cdot}85}} \qquad \ldots\ldots\ldots (3)$$

B M = B G + G M. The required G M is read directly from Fig. 4 and B G is fixed in the usual way on the side elevation of the general arrangement drawing.

It will be noted that the transverse moment of inertia of the water plane about the fore-and-aft centre of the float has been omitted in the calculations. This amount is only of the order of 2½ per cent. of the total transverse moment of inertia of the flotation system, and is omitted to save complication of the expression for track.

IN THE DRAWING OFFICE.

UNIVERSAL STRUT CHART.

By R. RODGER.

THE generally accepted method of expressing the strength of tubular steel struts is by means of family curves in which crippling *load* in lb. is plotted against a base of l/K ratio for a series of arbitrarily chosen outside diameters. The disadvantage of this system is that not only does each family refer merely to *round* tubes, but each gauge and each yield point demands an individual family, thus requiring a not inconsiderable combination to cover all cases.

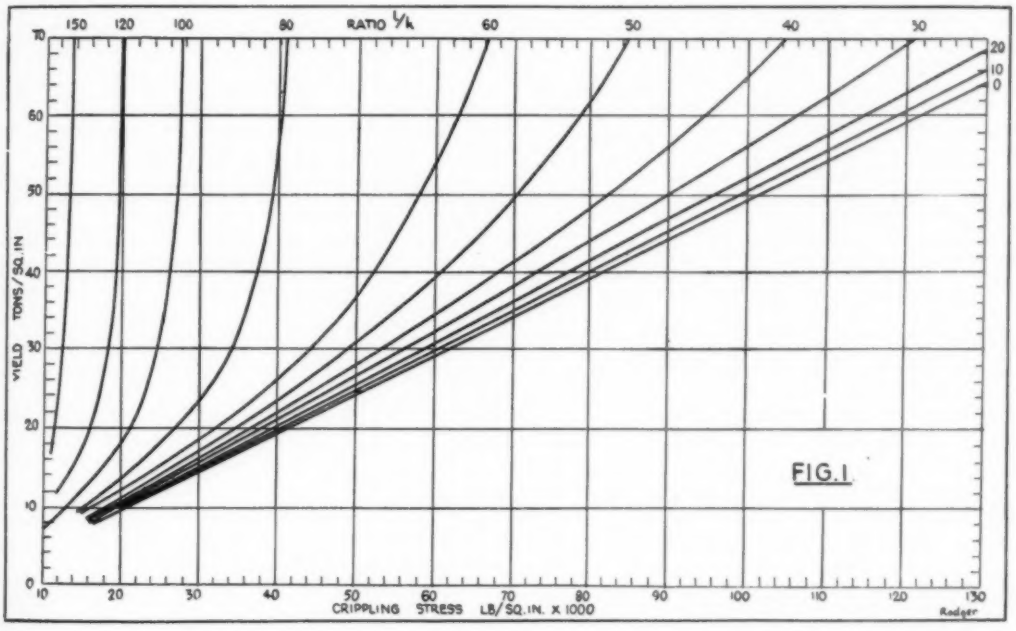
An improvement is effected by plotting a family of the well-known Southwell curves in which crippling *stress* in lb./sq. in. is plotted against a base of l/K ratio for an arbitrarily chosen range of yield points and a constant value of Young's modulus. Such curves may be applied with reasonable practical accuracy not only to round tubes but also to oval, streamline, and square sections.

The disadvantage here is that a separate Southwell curve is required for each yield point, and the generation of a Southwell curve by the method of Appendix VII of A.P. 970 is a somewhat laborious routine process. This method has been applied to a series of progressively increasing values of yield point and l/K ratio to obtain Table I for a constant value of E =

TABLE I

Crippling Stress (lb./sq in.) from Southwell Curves

Ratio l/k	Yield, tons/sq. in.						
	18	25	30	40	45	60	65
0	36,900	50,800	60,900	81,500	90,000	122,100	131,900
10	36,000	49,700	59,800	79,800	89,000	118,900	129,000
20	35,000	48,000	58,000	76,900	85,800	113,500	123,500
30	33,800	46,200	55,500	72,800	81,100	105,500	114,000
40	32,300	44,100	52,100	67,100	74,500	93,000	100,000
50	30,900	41,800	48,200	60,000	66,000	78,000	82,000
60	29,000	38,600	43,800	51,800	56,500	62,500	64,500
80	24,600	30,800	33,900	36,200	38,900	39,500	40,500
100	19,800	23,000	24,800	25,400	26,400	26,900	27,200
120	15,300	17,200	18,200	18,700	19,300	—	—
150	11,100	11,900	12,400	12,800	13,000	—	—



13,600 tons/sq. in. From the data contained in this table the universal strut chart shown in Fig. 1 has been plotted, the l/K ratio being replaced by yield point as a co-ordinate.

The writer has found this chart very helpful in the matter of rapid calculations concerning tubular steel struts, and offers same here as a labour-saving device in both the technical office and the design office. The advantage is, of course, that the chart is applicable to all cross-sections and to all grades of steel having the constant value of E = 13,600 tons/sq. in., which covers the practical aircraft range.

TECHNICAL LITERATURE

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS

These Reports are published by His Majesty's Stationery Office, London, and may be purchased directly from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, W.C.2; 120, George Street, Edinburgh; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square West, Belfast; or through any Bookseller.

NOTE ON THE VELOCITY DISTRIBUTION IN THE NEIGHBOURHOOD OF A CORRUGATED SHEET. By R. Houghton, M.A. R. & M. No. 1466. (5 pages and 4 diagrams.) April 15, 1932. Price 6d. net.

In connection with an investigation on the formation of waves by wind some experiments were made on the distribution of normal pressure over the surface of a train of waves. One wall of a 3-ft. wind tunnel was covered completely with simple harmonic corrugations, and it was thought that an investigation of the flow in the neighbourhood of the corrugations would be of interest, as an example of a completely turbulent boundary layer.

Two sets of corrugations have been investigated, of wave-length 7·6$_3$ cm. (3 in.) and 2·6 cm. (1·0$_2$ in.), the ratio height/wave-length being 0·4 in both cases. The 7·6$_2$ cm. corrugations were investigated at wind speeds of

1,400 cm./sec. (46 ft./ sec.) and 465 cm./ sec. (15 ft./sec.). The 2·6 cm. corrugations were investigated at 1,400 cm./sec. only.

It was found that, within the boundary layer, the relation between total head and distance from the corrugations was approximately linear.

THE EFFICIENCY OF A TAILPLANE MOUNTED BEHIND A WING OF R.A.F.34 SECTION. By D. M. Hirst, M.A., and A. S. Hartshorn, B.Sc. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1478. (4 pages and 6 diagrams.) April, 1932. Price 4d. net.

It has been known for some time that a stream of eddies from the wing may pass over the tail of a low wing monoplane and affect its aerodynamic characteristics. The velocity in the neighbourhood of the tail has been investigated both for monoplanes and biplanes, but little work seems to have been done on the tail efficiency and the downwash behind a monoplane wing. The present report describes a preliminary experiment on a skeleton monoplane, consisting only of a wing and a tail connected by a "sting."

Extending behind the aerofoil there is a wake of decreased total head, which is a narrow band near the plane of the chord line at small incidences and extends upwards very considerably as the stalling angle of the wing is approached. In the vicinity of this wake, there is also a drop in tail efficiency, defined as the ratio of the change of lift actually given by the tailplane to that which would be given in free air by the same change of incidence at the same flight speed, and this drop is greater than the percentage drop in total head at low incidences and less than the percentage drop on total head over the stall.

The wake appears to have little or no effect on the variation of the downwash along a vertical line.

SOME WIND TUNNEL TESTS ON WHEELS, FAIRINGS AND MUDGUARDS. By F. B. Bradfield, Math. and Nat. Sci. Triposes, and G. F. Midwood. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1479. (14 pages and 14 diagrams.) March, 1932.

Very little quantitative information is available as to the effect on undercarriage drag of fitting mudguards, fairing the wheel and strut joint, or changing the type of wheel. Mudguards have been found necessary in some instances, mainly to protect the airscrew from small stones, etc., thrown up by the wheels when taxiing and various forms are in use: such as a small guard over the top of the wheel, or a scraper-plate behind the wheel. These will involve extra weight and extra drag. A second type of mudguard has therefore come into use, in which the mudguard is also a fairing designed to reduce the drag, and so compensate for the unavoidable added weight. The tail-fairing and spat are of this type.

Apart from the question of mudguarding, the fairing of the undercarriage has been considered; local fairings about the strut joint have been tested, and methods of improving the wheel shape considered.

The unit taken for test was half the undercarriage of an interceptor fighter less oleo; that is to say, one wheel, a length of axle, two strut ends, and the connecting joint. The drag of the complete undercarriage is estimated to be 16 lb. at V = 100 ft./sec. Changes in this drag are:—

(*a*) 3 to 4 lb. may be saved by fairing the axle-strut joint.
(*b*) 7½ lb. may be saved by enclosing the wheel in a spat.
(*c*) The addition of a tail-fairing does not improve the drag.
(*d*) The mudguard fitted over the wheel increased the drag by 3½ lb.
(*e*) 6½ lb. may be saved by fairing the wheel and fairing the axle-strut joint.
(*f*)-(*g*) The fabric-covered wire wheel, and the disc wheel of comparable size have the same drag. For wheels tested alone:—

The drag of axle or struts, with service fairing, was about 1½ lb. per sq. ft. of frontal area. The increase of speed corresponding to (*b*) above would be about 4½ m.p.h. on 200 m.p.h.

TESTS OF A NINE-CYLINDER RADIAL ENGINE AT REDUCED MIXTURE STRENGTH AND WITH VARIABLE IGNITION TIMING. By J. Swan, B.Sc., and A. W. Morley, M.Sc., Whit.Sch. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1485. (12 pages and 15 diagrams.) September, 1931. Price 9d. net.

With a view to estimating the possible economy in fuel consumption of aircraft engines, tests were conducted at the Royal Aircraft Establishment to explore the effect on specific fuel consumption, at various power outputs, of weakening the mixture strength with change of ignition timing.

From an aerodynamic investigation it is found there is a relation connecting torque and rotation rate which varies little between different aircraft in level flight over the range from maximum level speed to the speed for minimum drag.

In general it appears that there is little change in torque as the specific consumption is reduced from 0·6 lb./B.H.P./hr. (the normal carburetter setting with no altitude control) to 3·5 lb./B.H.P./hr. At high torques the minimum specific consumption is of the order of 0·46 lb./B.H.P./hr., but increases as the torque and speed are decreased by throttling.

The mixture strength for minimum specific consumption occurs at a torque approximately 10 per cent. less than the maximum for any particular consumption loop. Under full throttle conditions no definite improvement by advancing the ignition timing is obtained until the torque has fallen approximately 9 per cent. from the maximum at any constant speed. Over loops at part throttle an improvement is obtained at a lesser reduction in torque.

The maximum temperature of the cylinder head for a full throttle loop shows an increase of 50° C. from the temperature recorded at the richest setting, and occurs when the torque is 5 per cent. less than the maximum for the loop. When the power output of the engine is restricted on speed and throttle opening the increase in temperature from initial readings is not so pronounced while the maximum values are less. The maximum temperature for any loop occurs at approximately the correct mixture strength except for the full throttle loop where it occurs at a weaker mixture.

It is noteworthy that the endurance run was completed satisfactorily but it would be unwise to accept, without further tests, the low specific consumption used as entirely suitable for all similar engines.

WIND TUNNEL TEST OF LIFT AND DRAG MEASURED IN A VELOCITY GRADIENT. By F. B. Bradfield, Math. and Nat. Sci. Triposes, and J. Cohen, B.A. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1489. (4 pages and 4 diagrams.) June, 1932. Price 4d. net.

The wind gradient near the ground on an aerodrome may be considerable, the wing being slowed up near the ground. The effect of such a gradient on the lift coefficient of an aeroplane when taking off or coming in to land is not known, and an attempt has been made in a wind tunnel to get some idea of the order of this effect.

To produce a velocity gradient in a 7-ft. wind tunnel, the floor was roughened excessively as far ahead of the test as possible, so that the velocity gradient was produced by an exaggerated boundary layer. The roughening was produced by fixing "fences" of wire gauze across the tunnel floor, starting immediately after the honeycomb. Each "fence" was 6 in. high, the wire diameter was 0·0165 in., and the wires were spaced 7 to the inch.

Lift and drag were measured on two aerofoils, and on a circular cylinder. For a positive wind gradient (*i.e.*, velocity increasing with height) the lift coefficient is less than in a steady wind. The effect would be very small for any gradient likely to be experienced above an aerodrome. The circular cylinder experienced a downward force in a positive wind gradient.

THE AERODYNAMIC CHARACTERISTICS OF A SEMI-RIGID WING RELEVANT TO THE PROBLEM OF LOSS OF LATERAL CONTROL DUE TO WING TWISTING. By A. G. Pugsley, M.Sc. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1490. (11 pages and 4 diagrams.) June, 1932. Price 9d. net.

In some previous papers, theoretical expressions for the critical reversal speed at which the ailerons of a monoplane become ineffective due to its elastic deformation, have been based upon the assumption that the net effect of the aerodynamic terms involved could be adequately represented by two-dimensional strip theory. In order to determine the effects of this assumption, it appeared desirable to analyse the aerodynamic aspects of the problem for a semi-rigid wing in terms of the Prandtl circulation theory.

It is found that the relation between strip theory and circulation theory results can be simply expressed in terms of aspect ratio and of certain rolling moment "induction coefficients" which can be determined theoretically. From the equation expressing this relation it is found that for the prediction of the critical reversal speed for a semi-rigid wing, strip theory and circulation theory will normally be in good agreement.

SUMMARIES OF N.A.C.A. TECHNICAL REPORTS

The National Advisory Committee for Aeronautics is the American equivalent of our Aeronautical Research Committee, with headquarters at Washington, D.C. The Technical Reports issued by the N.A.C.A. are obtainable from the Superintendent of Documents, Washington, D.C., U.S.A. In the summaries printed below the prices of Reports are given. These prices are net, and a small amount should be added to cover postage. For the guidance of potential purchasers it may be pointed out that the Reports rarely exceed 5 oz. in weight.

No. 419. WIND-TUNNEL RESEARCH COMPARING LATERAL CONTROL DEVICES, PARTICULARLY AT HIGH ANGLES OF ATTACK. I. ORDINARY AILERONS ON RECTANGULAR WINGS. By Fred E. Weick and Carl J. Wenzinger.

This report is the first of a series in which it is intended to compare the relative merits of all ordinary and some special forms of ailerons and other lateral control devices in regard to their effect on lateral controllability, lateral stability, and airplane performance. The comparisons are based on wind-tunnel test data, all the control devices being fitted to model wings having the same span, area, and airfoil section, and being subjected to the same series of force and rotation tests.

In this particular report, the results are given for ordinary ailerons of three different sizes. The medium-sized ailerons, which with equal upward and downward deflection are used as a standard for comparison, had a chord 25 per cent. of the wing chord and a span 40 per cent. of the semispan of the wing. Of the other two sizes, one was long and narrow, and the other short and wide. The results are given for five different aileron movements: one with equal up-and-down deflection, one with average and one with extreme differential motion, one with upward deflection only, and one with the ailerons arranged to float with respect to the wing.

The results showed that although the ailerons of medium size with either the equal up-and-down or the commonly-used differential motions gave very unsatisfactory control above the stall, satisfactory control was obtained with the short, wide ailerons with upward deflection only, and was closely approached by the same ailerons with extreme differential motion. The short, wide and the medium ailerons with upward deflection only also gave powerful yawing moments which at all angles of attack would aid the rolling, although with small deflections above the stall slight adverse yawing moments occurred. The only ailerons which gave no adverse yawing moments at any deflection or angle of attack were the short, wide ones arranged to float.

No. 422. WIND-TUNNEL RESEARCH COMPARING LATERAL CONTROL DEVICES, PARTICULARLY AT HIGH ANGLES OF ATTACK. II. SLOTTED AILERONS AND FRISE AILERONS. By Fred E. Weick and Richard W. Noyes.

Three model wings, two with typical slotted ailerons and one with typical Frise ailerons, have been tested as part of a general investigation on lateral control devices, with particular reference to their effectiveness at high angles of attack, in the 7 by 10-ft. wind tunnel of the National Advisory Committee for Aeronautics. Force tests, free-autorotation tests, and forced-rotation tests were made which show the effect of the various ailerons on the ground performance of the wing, on the lateral controllability, and on the lateral stability. In general, the slotted and Frise ailerons tested were inferior in rolling control at 20° angle of attack to plain ailerons of the same size. The adverse yawing moments obtained with the slotted and Frise ailerons were, in most cases, slightly smaller than those obtained with plain ailerons of the same size and deflection. However, this improvement was small as compared to the improvement obtainable by the use of suitable differential movements with any of the ailerons, including the plain.

From the Clubs

LONDON AEROPLANE CLUB

During the past fortnight Messrs. E. J. Jobling Purser, A. A. Wolff, and F. Wilson made successful first solo flights, and Messrs. Gilbert Elliott and E. J. Jobling Purser qualified for "A" licences. Mr. M. N. Mavrogordato made a very fast trip from Newcastle to Stag Lane, doing the trip in 2 hr. 20 min. We were pleased to welcome back Mr. Rodney Hannen after his illness, he flew to Stag Lane in his Pobjoy "Klemm" on Friday, February 10. Several names have been received for blind flying courses, which are being carried out at dual rates; these include Messrs. O. H. Furlong, G. Lyon, and W. R. Oliver. Members are reminded that the house dance is being held on February 25.

CHEERFULNESS AT BROOKLANDS

Saturday evening, February 18, was a momentous occasion at the Brooklands Aero Club, for the first annual dinner and dance since its formation in its present form was held on that night. Naturally, Capt. Duncan Davis was in the chair, for the club, and in fact all flying activities at Brooklands since December, 1928, owe their being and well-being to his amazing capacity for organisation, coupled with the proverbial tact with which he overcomes all difficulties.

Starting with two Renault-Avros, Duncan Davis and the late Ted Jones founded the business, which has now become quite impressively large in its scope. In those days, these two pioneers did everything themselves, working from dawn till dark, and getting very little for their trouble. Times are, of course, still difficult, but the seeds sown by their enthusiasm are beginning to bear fruit, and now Duncan Davis virtually controls not only the Brooklands Aero Club, but also the Cinque Ports Flying Club at Lympne and the Northampton Aeroplane Club at Sywell. There is also a rumour of a branch club being formed at an aerodrome not so very far distant from Rotterdam. At Brooklands there is, besides the club, the flying school, extensive workshops and a repair section, a growing and efficient sales organisation which holds the south counties agency for all de Havilland aircraft, the practical aircraft side of the College of Aeronautical Engineering, which is training so many young men to be efficient aircraft engineers, and most recently of all a taxi service called Brooklands Airways, Ltd., which has bought up Personal Flying Services, Ltd., operated for so long by the late Maj. "Nobby" Clarke, and latterly by Mr. W. Ledlie. The new company will have for its directors Capt. Davis, Mr. F. R. Walker and Mr. Ledlie. The machines actually owned by this company will for the present be a Junkers F.13 (Junkers "L.V") and a "Puss Moth" ("Gipsy III"). Further machines will be chartered from Brooklands Aviation, Ltd., as required.

Some 100 people gathered for the dinner on Saturday and cheered loudly when Capt. Davis rose to make what he referred to as "his first speech." He stressed the fact that Brooklands had grown and was still growing without any Government assistance. He referred to the formation of the new clubs already mentioned, and spoke in glowing terms of the help they had always received from Dame Ethel Locke-King, the proprietor of Brooklands, and Mr. Percy Bradley, the manager. He attributed the excellent way in which activities at Brooklands continued to grow very largely to the team spirit present there. (Duncan might have said that he himself was invariably responsible for fostering this all-important team spirit.—ED.) And in conclusion he remarked that everyone at Brooklands was very proud of its history, but now they were looking forward, not backward, so "just watch our smoke in the future."

Wing Com. A. H. Orlebar then rose to reply for the guests. He did so, he said, in place of Col. Shelmerdine, the Director of Civil Aviation, who was unavoidably prevented from being present. He referred to the past history of Brooklands and to the difficult times which Capt. Davis and the late Ted Jones had had. He also announced the gratifying fact that now since the formation of the club 300 pilots had been trained without a single pupil being damaged in any way. Later in the evening the proceedings were enlivened by a demonstration of the emergency arrangements which have been made for landing aircraft at night. When a Klaxon was sounded, everyone went out on to the aerodrome to find a machine flying round. Flares were quickly lighted and the machine landed by their light. Out of it stepped two grotesque looking figures dressed in tights and having knarled and knotted, or else particularly muscular, limbs. They appeared to bear each other ill-will, for it was only with difficulty that the flying mass of legs and arms was sorted out. The combatants were then taken to the club-house, where they were announced as the world's two greatest exponents of "all-in wrestling"! Without more ado they flew at each other again, and continued to do so at intervals for some considerable time. They burlesqued the real thing in an incredibly funny manner, and must have received many hard knocks and wrenches from the way they threw themselves about, but we doubt whether they ached as much as most of the audience did who literally "split their sides" throughout the whole performance. (Let's have this again, Duncan; Bill and George are almost too good to be wasted merely on flying!—ED.) Another pleasing variety to the programme was provided by Mr. W. E. Davis, Capt. Davis's brother, who is manager at Lympne, and his friend, Mr. G. J. Geoghegan. They entertained the assembly with many duets to a ukulele accompaniment. A spot dance with prizes was announced during the evening, the winner being Miss M. Weyman and Mr. E. L. Gay. When we left, the party were dancing hard and looked like showing their appreciation of the efforts of the management by doing so until the very early hours.

The School has been unusually busy during the last fortnight, quite a number of new pupils having joined. A scheme for co-operation between ground police and special detachments in the air has just been developed at Brooklands, with a view to testing the possibilities of wireless communication between aerial and ground policemen. The new Wolseley aero engine, a radial, and fitted in a Hawker "Tomtit," is being tested at Brooklands. A special meeting of the Press Aero Club has been called for Sunday, February 26.

Another batch of students has just been drafted from Chelsea to the College of Aeronautical Engineering at Brooklands. The new hangar which houses the students is now completed; it may look like a hangar outside, but inside it is beautifully decorated and very comfortable.

READING AERO CLUB

The year 1932 has been one of steady improvement for the Reading Aero Club; the membership has shown an increase of 30 per cent., the hours flown amounted to 1,654 and the "A" licences totalled 34. During the year

TO THE JUNGLE BY AIR: Mr. R. Hamilton, Mr. H. W. D. Longden (former Rhodesian Administrator) and Mr. Roger Courtney, who are flying in a Spartan three-seater to Africa, where they will "shoot" big game with a film camera.

a "Gipsy Moth" was purchased, bringing the club's machines to five. Cross-country flying has shown a big increase, most of the neighbouring aerodromes having been visited.

Three young men, Messrs. Roger Courtney, the Kenya big game hunter, H. D. Longden, and C. F. Cockburn, intend to fly from Reading aerodrome to Nairobi to shoot a jungle film. The producer, Mr. Richard Hamilton, is travelling by air in advance, taking cameras and other equipment. The plane being used is a three-seater Spartan, which has been supplied and specially equipped by the R.A.C. and will be piloted by Mr. Cockburn.

FANCY DRESS AT HANWORTH

Hanworth Club always manage to organise very excellent dances and entertainments. On Saturday, February 18, they surpassed themselves with a Masked Ball. A very large number came to it and the dresses were far better than are usually to be seen at this type of entertainment. The first prize for ladies was gained by Miss O. Herard, as a Hawaiian girl, the second by Mrs. Holder, who was voted the most original lady for a dress representing the ladies tennis outfit of the 80's, Miss Aldridge, as the skull and cross-bones, received a consolation prize. The first prize for gentlemen was given to Col. Holbrooke, who came as a Knight of the Bath, the second, and most original, to Mr. Cathcart Jones, as a red devil, and the consolation prize to Capt. Rushton, who represented a corpulent Turcoman. Lady Muskerry presented the prizes, which were particularly useful and unusually original.

Club flying has been more than usually brisk throughout the week, and the instructors have been kept busy each day. On Sunday Mr. Arthur Carpmael, whose son and daughter already have pilots licences, successfully passed tests for his own "A" licence. Lady Cathleen Nelson has put in a great deal of time in the air, and on Friday last Lady Dorothy Clayton, East Clayton, brought her "Spartan" machine to Hanworth and took dual instruction, preparatory to her flight to the Libyan Desert. Lt. O. Cathcart Jones flew a "Desoutter" to Stoke and returned in the afternoon; Mr. Armitage carried out his height tests for an "A" licence; Mr. E. Forsyth was given dual instruction on his Klemm; Mr. D. Llewllyn carried out a cross-country; and Prince Sadiq continued instruction for an "A" licence. The good weather over the week-end has accounted for over 43 hr., the Club machines being kept very busy.

THE CINQUE PORTS FLYING CLUB

In spite of high winds and thick fog, quite a fair amount of useful work has been done during the last fortnight. On Monday, February 6, Mr. and Mrs. Mollison arrived, and had an early morning tea party before taking the air. Mr. Patterson, the ground engineer, has now commenced a series of lectures on "Gipsy" engines and D.H. aircraft. A set of instruments has been prepared by the staff, and has been sectioned to show the workings of various parts. Visitors included Lady Bailey on her return from the Cape flight attempt.

SURREY AERO CLUB

The mild weather which Gatwick has experienced during the past fortnight has increased flying activity, and much instruction, taxi work and joy-riding has been done. Owing to the number of aeroplanes using the aerodrome, it has been found necessary to encroach on the Hunterised portion, and although the grass is still very thin, it has stood up to the wear and tear. Mr. Payne, the Chief Instructor, took the Redwing on a tour of the country, which lasted three days. He flew about 1,000 miles and put in 13 hours' flying time. The petrol consumption worked out at 5.2 gallons an hour and the oil at 2 pints an hour. Improvements in the club-house continue, and three more bedrooms are now available.

GRAVESEND SCHOOL OF FLYING

The School is now in full working order, hangars, airframes and engine workshops being all completed. By the purchase of another "Gipsy Moth" (all metal) the club's fleet has been brought up to four. In the course of last week Mr. Wynward Wright, headmaster of H.M.S. *Worcester*, and Mr. J. Coats went solo; Mr. Fortescue obtained his "A" licence, having gone solo after just over 5 hr. dual. The club house and offices are now well past the first storey stage, and the aerodrome staff are anxiously awaiting the day when it will be completed and opened.

HAMPSHIRE AEROPLANE CLUB

Although the Airport Sub-Committee of the Southampton Municipality only took over Atlantic Park Aerodrome, Eastleigh, on January 1, much has already been done. The Committee is lucky in having for its chairman an enthusiast in the person of the Mayor, Councillor F. Woolley. He realises the value to Southampton of a municipal airport, and is keen to see it established firmly. Unfortunately, we understand that certain Labour Members of the Town Council are convinced that the aerodrome is only useful for the establishment of a bombing squadron(!) and as this is not in keeping with their pacifist views they obstruct any development schemes, thus delaying all improvements. The Mayor, however, ably supported by Councillor Hector Young, who was, perhaps, responsible more than anyone else for getting the aerodrome for Southampton, has been able to get quite a large amount of work sanctioned. The aerodrome has been levelled in places and an extra 30 acres will be taken in in March, making 170 acres in all.

One hangar has been let to Supermarine Aircraft and another is said to be the subject of negotiation by a firm which has aspirations to ferry and taxi work.

The Club has been established in a convenient building for the past three months and already many new members have been obtained.

Improvements are taking place in this building every week and before long it is hoped to have five bedrooms available for visitors.

The aerodrome is well situated and convenient. Buses pass the gate every ½ hr. and a 15-min. ride lands one in Southampton. The trams are only 7 min. walk away and the aerodrome, being on the main road, is easy to get at by motor car.

The demand for flying instruction is growing, and two instructors find they have almost more than they can cope with. The fleet at present consists of a 3-seater Spartan, one "Moth" ("Cirrus III") and two "Moths" ("Gipsy I"). Later it is hoped to add two more "Moths" ("Cirrus III"). With the Spartan they have done much joyriding, and find suggestions like "A flight above the clouds," "Seeing the docks from the air" or "Over your own house" attract a large number of people.

Mr. W. C. Matthews, the first new member to join after the move to Eastleigh, gained his "A" licence on Sunday, February 12, while several more pupils are fast approaching that much-envied state.

Like most businesses the Club have found the need for economy, and one of the most practical has been the repair and overhaul of their own aircraft, the extra space available in the large hangars making this possible and being one of the many advantages of the move. Coming to this aerodrome has also brought the Club near to Winchester, where the 60th Rifle Brigade have their depôt. Officers of the Brigade have already joined the Club, and in one case learning to fly has been followed by the purchase of an aircraft. It is hoped that many more officers will follow suit.

MAIDSTONE AERO CLUB

On Sunday, February 12, the club held their monthly Clay Pigeon Shoot, which was well attended and a great success. The club are now arranging facilities for archery, that members may spend spare time at this interesting sport. As the days are getting longer so flying steadily increases, and it is hoped the club will have a good summer. On Friday, March 3, the club will hold their spring dance, which will be the last of the season. Tickets are 5s. 6d. each, including supper.

NORTHAMPTONSHIRE AERO CLUB

The Sywell Dance and At-Home on Saturday and Sunday were both very successful. Among those who visited the aerodrome were Messrs. Ahlers, Woods, Sparks, Hordern, Midgley, Nelson; all stayed for the At-Home on Sunday, and flew home when dusk approached.

YORKSHIRE AEROPLANE CLUB

Over 40 hr. have been flown during the last fortnight, which is an increase over preceding weeks. Dr. H. W. March passed his tests for an "A" licence. The Dutch "Pander" of Mr. Ten Bos, which has been at Nottingham since Christmas, returned to Yeadon on Friday, February 10.

THE IRISH AERO CLUB

Three de Havilland "Moths" of the Irish Aero Club flew a total of 1,031 hr. 20 min. during the year ended December 31, 1932. The ground staff of the Club now consists of two instructors, both ex-R.A.F. men, and a ground engineer. Membership at the end of last year totalled 173, of which 96 had joined as pilot members.

Fifteen pupils obtained their "A" licences at the Club's headquarters at Baldonnel, County Dublin, during the year and two of these obtained "B" licences. Only flying time for the last nine months of 1931 is available, and the figures for the corresponding period of last year show an increase of 87 hr., despite very bad weather during the last two months. Last week a very successful dance in aid of Club funds was held in the Gresham Hotel, Dublin, and it is planned to hold a pageant and several "At-Homes" at Baldonnel during the coming summer.

LANCASHIRE AERO CLUB

Despite the cold weather flying hours for the past month have been reasonably well maintained, and most week-ends have seen all machines busy, while during non-flying weather Mr. Yuill has been giving theoretical instruction in navigation and blind flying.

The Rodman Landing Competition (Seniors) was won by Mr. Colin Wilson, and the Pemberton Trophy (Junior) by Mr. G. F. Oddy, Miss Joan Hunter competed in the Junior Competition, being the first lady member to compete in this section for some time. Mr. Colin Wilson is to be congratulated on his having his "A" licence endorsed for blind flying, and on having won the Gale and Polden Cup, presented for the best blind-flying pupil for 1932. The return visit of the Liverpool Aero Club took place on February 5, when sixteen members from that Club descended at Woodford and were entertained.

The Lancashire Aero Club now offers complete training for an "A" licence at an inclusive fee of £25, while the solo charge has been reduced to 30s. an hour. The Club are also considering the purchase of a Lowe-Wylde "Baby" aeroplane, with a view to offering even cheaper flying practice.

A RED LETTER DAY

On Saturday, February 18, some members of the Messenger Boys' Flying Club (an organisation of the Commercial Cable Co., Ltd.) were treated to flights in an "Autogiro" by Messenger F. J. Cable, one of their own members. Cable, who is only 17½, has now done 35 hr. solo flying since getting his "A" licence last September, and has turned out to be an excellent pilot. It is interesting, too, as with him the company has both the youngest and oldest "Autogiro" pilots. The latter is Mr. J. A. McMullen, aged 70, who owns and flies his own machine. He is now retired, but used to be with the company.

AIR SERVICE TRAINING

A VISIT to Hamble is always of interest now that the Air Service Training College is proving such a success. They recently took over the buildings previously used by the Hampshire Aeroplane Club, and these are now being put into order for a variety of purposes. One of the most important is housing the wireless section of the school. This will comprise the operating room for the school's own wireless station, lecture rooms, and a series of silent cabins wherein pupils can send and receive messages from and to the school's aircraft cruising in the vicinity. This wireless course is of very great benefit to all commercial pilots, and the full 3-4 years' course at the school includes it in its curriculum. Both telegraphy and telephony are taught and a sending and receiving speed of 25 words per min. is aimed at for the former. This long course is replacing university training for public schoolboys whose parents realise the advantages offered in aviation for the thoroughly trained man. At the present time there are in residence boys who have recently left most of the great well-known public schools, and at the end of their time they will have not only their "A" and "B" pilots' licence but also a second-class navigators' certificate, commercial wireless operators' certificate and ground engineers' licences A, B, C and X. With regard to the latter, a certain limited number of students are trained for these licences only, and a scheme is shortly to mature under which students who have passed through the College of Aeronautical Engineering at Chelsea and Brooklands will go on to Hamble for a period of practical experience where they will be employed on maintaining the aircraft and engines actually in use. This will be of great value to them, as Hamble is practically the last training school still using Service types of aircraft as well as the medium and light type training aircraft. A further advantage for them is the seaplane school situated in part of the old works of A. V. Roe & Co., Ltd.

Other building developments include a new squash racket court and another block of bedrooms. A cinema is being erected where instructional films of aircraft in flight will be shown. A photographic lecture room and dark room are being built so that students may take a course of aerial photography and air survey work should they wish to do so, while for officers under reserve training there is also a section set aside for armament lectures. The hangars previously occupied by the Hampshire Aeroplane Club are now rooms wherein students for ground engineers' licences can obtain practical work on airframes and engines. Many old and notable aircraft have found a last resting place there, including the Avro "Avenger," the fuselage of two of the first "Autogiros" built, the Armstrong-Whitworth "Starling" and many others. In the engine section there are engines fit for running on the bench which are pulled to pieces and reassembled and also used for tracing running faults. The fleet of aircraft used at the school is being increased steadily and will, when the additions at present in hand arrive, consist of seven Avro "Cadets," two "Cutty Sarks," one Avro VI, four "Atlases," two "Tutors," one Avro 626, one "Siskin" and three D.H. IX J's.

During January flying has been continued on Service and civilian aircraft of various types. Mr. Dhawan obtained his "B" licence, Mr. Mehta completed his night-flying test, and Messrs. Lee, G. Kennedy and Norman were awaiting a favourable opportunity to do likewise; Mr. Norman also completed his blind-flying course. Messrs. Hankey and Pease passed "A" licence tests and Mr. Beckmann passed the examination for a second-class navigators' certificate. New arrivals include Mr. Hales, who is taking the wireless course and Mr. Combe who is taking his "B" licence.

Considerable interest has been aroused by the new apparatus designed by the staff for giving ground instruction in blind flying. An example of this apparatus was recently purchased by the Air Ministry for use at the Central Flying School.

The staff has been increased by the appointment of Mr. W. G. Parsonson, B.Sc., A.F.R.Ae.S., as chief ground instructor; he will be responsible for all ground instruction relevant to the "A" and "B" pilots' licences, the "A" "C" and "X" ground engineers', the navigators' and the wireless operators' licences, which will enable Mr. A. R. O. McMillan to devote his time to flying instruction.

Rollason Aviation Co., Ltd.

As reported in last week's issue of FLIGHT, Rollason, Muir & Rickard, of Croydon, now operate under the name of the Rollason Aviation Co., Ltd., and report increased activities both at Croydon and Ford aerodromes. Two pupils of the School, Mr. Barr and Mr. Whitehead, passed their "A" licence tests the week before last at Ford, and Mr. Gough, another pupil, has successfully made his first solo flight. Several other members will be ready for their "A" licence test in a week or two. Unlike Croydon, weather conditions at Ford aerodrome have been very favourable for the time of the year, and a considerable number of flying hours were put in by pupils. Rollason Aviation Co., Ltd., have now definitely completed arrangements to take over the lease of Ford aerodrome, and many improvements have been made in the workshops where up-to-date plant has been installed, which includes an automatic air compressor, operating pneumatic tools and spray guns, etc.

The sale of a "Gipsy I Moth" was effected last week at Croydon. It was sold to Mr. W. A. C. Kingham, previously of Gravesend Aviation, Ltd. This was one of the aeroplanes used by the British Arctic Air Route Expedition, and was first registered as G-AAUR, but has since been completely rebuilt by Rollason Aviation Co., Ltd., and is now registered G-ACCY. Mr. E. F. Palmer, formerly of the Northampton Aero Club at Sywell, will shortly join R.A.C. as Chief Instructor at Ford, as Mr. T. Nash will be accompanying Capt. Rollason early in April when they join the British Hospitals Air Pageants Tour. Mr. Kingham will also join the tour in his new machine.

American International Air Races

(An abridged edition of the paper read by Mr. R. L. Preston before the Royal Aero Club on Wednesday, February 22.)

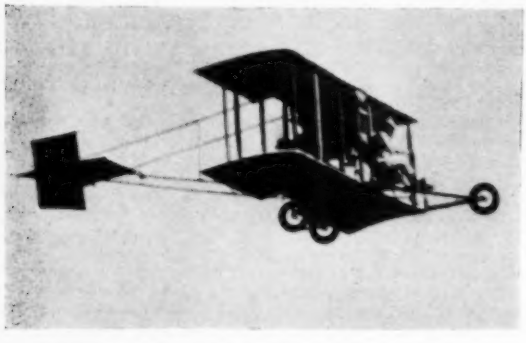
THE Races originated shortly after the war and have since been held annually in twelve different cities. In 1929 the success at Cleveland was the deciding factor for the meeting to be held there every five years. After the close of the 1930 event at Chicago, therefore, a special aerodrome was built at Cleveland for the purpose. The races last for ten days, which, including as it does two week-ends, ensures a very large gate.

Finance

The management is a limited company, formed for the purpose. Last year, although the economic conditions were bad, all backers of the meeting received full repayment of their investments, and even after all expenses had been paid there was a considerable profit. In America nearly all aircraft racing are specially built for the purpose and are financed not by the aircraft firms but by various "Associations." These Associations are formed to enter their own machine, and they place their order with any firm they choose. Money obtained from prizes and eventually from the sale of the aircraft is divided amongst the members of the Association according to the shares held. In 1932 nearly all the aircraft in the Thomson Trophy Race were financed by such Associations, the winning machine being the property of the Springfield Air Racing Association. It is said that this scheme would not work in England, but I believe that if there was a chance of some return on the money invested, by the provision of good prize money, enthusiasts could be found who would form themselves into syndicates for the purpose.

Organisation

The National Air Races Committee have permanent headquarters in Cleveland, and seven months are spent in actual organisation. The permanent staff is small, but many thousands are employed for the days of the races. Crowds attending usually number about half a million. The Races are considered to be the rendezvous of the American aircraft industry, but as there is an annual American aircraft show, there is no attempt to make the Races into a show of new aircraft. The Races are a success owing to the fact that they are run on well-organised business lines. The programme is spectacular, and the prize money large enough to attract entries. The gate is drawn chiefly from people in or around Cleveland. A permanent stadium, with grandstand, for accommodation for 45,000 spectators has been built on the Cleveland Municipal Airport. Timing and judging towers have been erected, and the layout generally made suitable as an air racecourse. An area at the end of the grandstand is divided into individual "aero pits," all competitors having their own pit. These are arranged so that spectators may inspect the contesting aircraft without entering the pits or the aerodrome.



AN OLD TIMER : A 1910 Curtiss pusher which staged a dog fight with an "Autogiro."

Pylon Courses

Many of the races are pylon races and the 90-ft. home pylon is placed opposite the centre of the grandstand, at the end of a 1,000-ft. starting and finishing line. As the grandstand is therefore 1,000 ft. from the pylon, there is no danger of injury to the spectators. At the 1932 Races there was a 3½-mile triangular pylon course and a five- or ten-mile rectangular pylon course ; the former was used for aircraft having an average circuit speed of 135 m.p.h., up to nine machines going round together, for races of approximately six laps. The latter was used for faster speeds, up to six aircraft going round together. The highest speed reached was 252 m.p.h. In addition there is a 3-km. straight-line course laid parallel to the grandstand, constructed so that attempts on world's records might be made.

Handicapping

For pylon racing handicapping is done (1) by cu. in. piston displacement limitation, there being seven classes varying from 115 cu. in. to 1,000 cu. in., the displacement being the only limitation. I suggest 200 cu. in. and 350 cu. in. being used as the start for air racing in this country. I suggest that the matter be taken up with the F.A.I. by the racing committee of the Royal Aero Club whereby definite limitations may be laid down so as to obtain an international standard. The second method of handicapping is by the advertised manufacturers' top speed. A third method was to fly the machines by the contesting pilot and two neutral pilots and to take the mean of these trials. In some cases machines had to qualify for a certain minimum speed. I suggest also that a certain maximum landing speed should be instituted. One design races were organised by various manufacturers for their own standard aircraft. In the Cord Cup cross-country race an interesting handicapping system was used. Each lap was a race in itself and at each control the competitor was re-handicapped for the next lap. Points allotted were determined by the actual miles on that particular lap. The percentage of points on each lap were as follows:—First 100 per cent. of the allotted points, second 60 per cent., third 40 per cent., and so on. The competitor having the most points at the finish of the last lap of the race was the winner, though he might not be the first man home. This prevented machines running away with their handicap and provided, what were in fact, a series of minor races creating great public interest.

Regulations Governing Pylon Racing

(1) Ballast to be carried instead of passengers. (2) Method of starting. Competitors are lined up, engines running according to the order of receipt of entries. All take off together and no aircraft may cut in front of another until a safe distance has been gained. An aircraft passing another must keep at least 150 ft. to the right or 50 ft. above the aircraft overtaking. Turns must be made to the left and outside the pylon. (3) Overtaking aircraft must pass between the smaller aircraft and the pylon. (4) After finishing, all aircraft must continue on their course until they have attained an altitude of 1,000 ft. ; they may then turn and land on the ground assigned for the purpose. (5) Pilots shall pass all turning points at an altitude of not over 500 ft. Any competitor failing to turn a pylon may make a turn inside the course and come back on to the correct course, passing the pylon correctly. (6) The referee may reject or exclude entrants if he considers the race overcrowded.

Timing

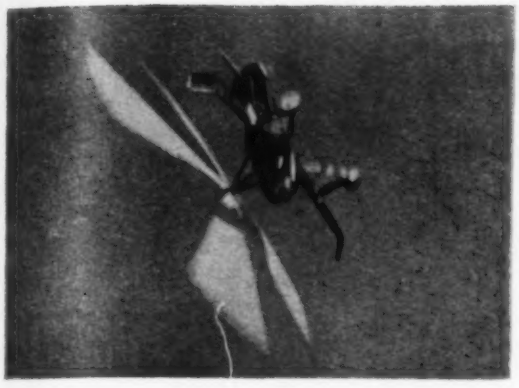
The National Aeronautic Association, with a two-eyed camera, taking 128 exposures per sec., photographing the aircraft on 2/3 of the film and an electric clock registering to 100th of a sec. on the remaining 1/3, was used for events on the 3-km. course.

Control

The Races are held under the Rules of the F.A.I., and sanctioned by the National Aeronautic Association. Any pilot breaking an aerodrome, or Department of Commerce, rule, is "grounded" by having his licence taken from him. He cannot fly until it is restored.

Accidents

As far as I can ascertain, the only serious accident, through collision during pylon races, occurred last year, when an amateur pilot attempted to overtake another



INVERTED: The "Autogiro" looping during an aerobatic display. Note the shadow on the rotor.

on the inside, neither were killed. In a dog fight between an "Autogiro" and a 1910 model Curtiss pusher. The pilot of the latter died as the result of injuries. Despite there being over 200 machines actually in the races, 43 of which were special or experimental types, and an average of over 900 landings a day, these were the only two serious accidents.

Amateurs

Amateurs had one cross-country and four pylon races, arranged by the U.S. Amateur Pilots' Association. They were not well patronised. There was an interesting relay race for Aero Clubs, each team being four members and one club aeroplane. The event was won by a Canadian Aero Club.

Prizes and Prize Money

In 1932 £10,145 were allotted to cross-country races, £10,809 to pylon races, £450 to prachute-jumping competitions and £8,433 worth of Cups, etc. The prize money amounted to 24.7 per cent. of the total cost of the races. Prize money is paid out each day if there are no protests, and is divided into the following proportions:—Of the money for the race, the first gets 45 per cent., the second 25 per cent., third 15 per cent., fourth 10 per cent. and fifth 5 per cent. A trophy is awarded to the professional pilot gaining the greatest number of points during the meeting. Prize money obtained by the three leaders for this trophy amounted in 1932 to:—First £3,400, second £2,200, third £800 and the leading woman obtained £800.

Cross-Country Races

The chief Trans-Continental Race is from Los Angeles to Cleveland for the Bendix Trophy. Another Trans-Continental Handicap Race is the Cord Cup, and then there is a race between New York and Cleveland for the William B. Leeds Trophy for men and women flying their own machines. I suggest races from European capitals to England as a means of getting foreigners to an English air-race meeting.

Programme Times

The official programme commences at 1 p.m. and runs to 5.30 p.m., the morning being devoted to practice. Events are shown by letters instead of the actual times on the programme, thus allowing the management committee scope for alterations. 5.30 p.m. to 8 p.m. is used for demonstrations and joy-riding and from 8 p.m. to 10.30 p.m. there is a night programme.

Items of Special Interest

(1) The Aero Club of Poland presented a trophy for an altitude race. Machines had to climb 6,000 ft. to an "Autogiro" dive to within so many ft. of the ground, climb up again and finally dive right down. (2) An "Autogiro" hurdle race, wherein competitors had to take off over a hurdle, land, come to a complete stop, and then take off again over the next hurdle, placed 150 ft. away, and so on over five hurdles. There were five laps of this course. (3) Another "Autogiro" race was run wherein the competitors had to fly to a series of flags, getting out and picking up each one before continuing to the next. (4) There were parachute-jumping contests. Every day jumps were made from 2,000 ft. to a predetermined spot. In one event a parachutist jumped from about 15,000 ft. and released handfuls of flour, which looked like smoke during his descent. He delayed his drop to 500 ft. the first two days, but thereafter a 1,000-ft. minimum was demanded by the Department of Commerce. (5) Other items were glider aerobatics, display by a radio-controlled aeroplane, dog fight between an "Autogiro" and a pusher, and aerobatics by an "Autogiro."

Foreign Pilots

In order to draw the crowd, foreign pilots appeared essential, and the programme has for the past three years included aerobatic displays by such visitors. This was one of the most successful features of the Races.

The Thompson Trophy

This is the climax of each year's meeting, open to any type of aircraft, and in 1932 the qualifying speed was 200 m.p.h. There were eight starters for this 100-mile ten-lap pylon race, which was won at 252.6 m.p.h. The Americans are most anxious for, and would I believe assist financially, an entry from England. I suggest reconditioning the S.6, as this machine should easily win the trophy and the world's landplane 3-km. record. Fitted with wheels and carrying the fuel required in the wheel spats, it should have a considerably lower landing speed than when on floats. The total purse for these two events was £4,000 without bonus.

Night Display

The chief item was an infantry attack on a village, followed by an air attack upon the same. Afterwards there was a gigantic firework display. One spectacular event was a single-seater fighter dive from 12,000 ft., with ignited magnesium flares attached to the wings. Afterwards the pilot went through a number of aerobatics. Other events included night parachute jumps with flares, a radio controlled aeroplane waltzing to the band and a flight by an aircraft equipped with fireworks.

Conclusions

I hope to have given a slight insight of the National Air Races of America. To make such a meeting successful in England, it must be on a large scale, be of advertising value to commercial manufacturers, remunerative to pilots, entertaining and of educational value to the general public. I suggest that an international meeting held in England would be a financial success held near London for the London hospitals, or perhaps at Blackpool, Portsmouth or Brighton. After a study of the American displays I have come to the following conclusions:—

1. That an air display on a large scale must be run by a limited company promoted solely for the purpose, with share capital and a permanent staff organising all the year round.
2. That such a meeting should be of five days' duration.
3. It must be international. Foreign machines and pilots draw the aeronautical community who bring their friends, thus increasing the gate.
4. Two hours is the maximum time spectators can watch a continuous flying display without getting a headache or eyeache from the noise or glare. At a big meeting I suggest 3 shows. 2 p.m. till 4 p.m. 6–8 p.m. and 9–11 p.m.
5. An aerodrome must be specially adapted as a permanent air race course for any big five day meeting and the comfort of spectators must be studied.
6. It has been found in the U.S.A. that our present type of handicap races either cross-country or pylon do not attract the crowd. Free for all pylon races limited to cubic inch piston displacement has proved very popular. With aircraft already built in America and machines being built for the Deutsch de la Meurthe Cup, an international limited pylon race in England might be considered.
7. In America the backing of races for advertising purposes by commercial companies other than those connected with aviation seems to have been more successfully exploited than here as also a formation of private syndicates for building racing aircraft. I feel this is solely because we have never had any National Air Races in England.
8. A night display in England during the summer might prove successful.
9. Those who see a number of air displays are struck by the monotony which has crept into our meetings, especially into exhibitions of aerobatics. Foreign pilots with specially built aircraft for aerobatics are obtaining large fees for their displays. They have learnt the art of staging, such as never getting between the sun and spectators, and always finishing their exhibition with a climax—such as landing off an inverted falling leaf or with propeller stopped or steep side slips, etc., good finishes to aerobatics are not often seen in England.
10. It is essential if ever a meeting of this description is held in England, it must have the backing of the S.B.A.C. and R.A.F. assistance.
11. Perhaps it would be worth considering one large international meeting as a rendezvous for the aircraft trade, instead of the Olympia Aero Show, the S.B.A.C. display and the various small pageants held all over the country. A five-day meeting makes it worth while for foreigners to enter for races or to visit the display, also it is unlikely the weather would be impossible for five days on end even in our renowned summer, and further, everyone would know the definite dates of this international event and make arrangements accordingly.

I have to thank Mr. Clifford Henderson (Managing Director of the National Air Races) for the various information he has given me and for the loan of the film which we will now see. (The film was then shown and operated by Mr. E. L. Norman, for whose help in obtaining the illustrations for this article, we are indebted.)

Correspondence

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

VEGA v. DRAGON

[2830] We were very much interested in your article in the December 22 issue, page 1212, regarding the de Havilland "Dragon." We agree with you that the "Dragon" is a noteworthy aeroplane, and the following is not intended in any way to belittle it. However, we feel that you and your readers may be interested in the comparison between this new de Havilland and Lockheed's "Vega," which has been on the market and sold in considerable quantities since 1926.

Our figures on the "Vega" are conservative and are based on actual knowledge gained by millions of flying miles.

Engine	"Vega" 1 Pratt & Whitney "Wasp" 450 h.p.	"Dragon" 2 "Gipsy Majors" 260 h.p.
Gross weight	4,750	4,200
Weight empty	2,600	2,300
Ratio of gross weight to tare weight	1·825	1·825
Cruising speed	155	111
Cruising range	460	460
Initial cost	$18,985	$13,960
Cost per passenger seat	$3,160·00	$2,330·00
Pay load	1,473	1,240
First cost per pound of pay load	$12·90	$11·25
Gallon per hour cruising	25	15·6
Gallon per passenger per hour	4·16	2·6
H.P. per passenger	75·0	43·4
Pay load per H.P.	3·28	4·77
Ton-miles per gallon	4·57	4·41
Number of pay passengers	6	6
Pounds of baggage per passenger	75·6	36·5

The foregoing figures are on a basis of short tons (2,000 lb.) and American gallons. We are enclosing a photograph of the "Vega."

This letter is sent to you in a spirit of friendly rivalry and you have our permission to publish it or not as you see fit.

CYRIL CHAPPELLET,
Secretary.

Lockheed Aircraft Corporation,
Burbank, California.
February 1, 1933.

[*We have sent a copy of this letter to Mr. C. C. Walker, of the de Havilland Aircraft Co., Ltd., and have received from him the following comments.*—ED.]:—

[2831] I should like to thank you for giving me the opportunity of making some comments on Mr. Chappellet's interesting comparison of the "Vega" and "Dragon." Comparison of two such extremely different types is naturally not easy, and it is gratifying to note the friendly way in which it has been done. Any remarks I may make are designed to elucidate the "Dragon" characteristics and certainly not to disparage that fine and well-tried aeroplane the "Vega."

There is a quite common mistake of considering that a "par" pound sterling exists—a contradiction in terms. An American, Englishman, Icelander, Chinese or anyone else, can buy a "Vega" for 18,985 dollars (5,530 pounds sterling) or a "Dragon" for 10,000 dollars (2,900 pounds sterling. There is no other price and no other relation between the cost of the machines. This will make the cost per seat of the "Vega" £925 (3,160 dollars) and of the "Dragon" £484 (1,660 dollars).

In comparing different aircraft commercially it is possible to divide their operational characteristics into those which depend on the first cost—obsolescence, insurance, interest on the one hand, and those which involve running costs—airframe and engine maintenance, fuel and oil. The first may be taken as 1.7d. per £1,000 first cost per mile if based on 600 hours' use per annum, and the second at 1.6d. per 100 b.h.p. per mile (based on English costs).

The second figure presupposes general similarity in speed, etc., of the aircraft compared, and assumes that the cost of maintaining the airframe may be related to the b.h.p. installed—a near enough approximation generally, but in this case unfair to the "Vega," because it has less wing per h.p. and is faster. If we reduce the 1.6d. for the "Dragon" in the ratio of the speeds given by Mr. Chapellet for the two machines, it becomes 1.13d. for the "Vega," and we have:—

	"Vega"	"Dragon"
1st cost charges—	1·7 × 5·53 = 9·4d. per mile	1·7 × 2·9 = 4·93d. per mile.
Running costs—		
	1·13 × 4·5 = 5·08d. "	1·6 × 2·6 = 4·16d. "
Piloting	= 2·0d. "	Piloting = 2·0 "
	16·5d. "	11·1d. "
	or 2·74d. per seat mile.	or 1·85d. per seat mile.

This merely means that speed costs money, and the "Vega" has attained a very high speed at what must be regarded as a very economical figure for that speed.

The "Dragon" has, however, been designed to facilitate operations without either subsidies or mail contracts, and the operating cost per seat mile is of predominant importance. It is, of course, nice to cruise at 150 m.p.h. partly at the taxpayers' expense, but if by cruising at 110 m.p.h. a large public can pay for air transport out of its own pocket, that then becomes the economic speed for the present. This is particularly so in the present comparatively undeveloped state of civil aviation here, where terminal delays and stops may do much to negative the benefits of high speed.

But there is much more than this in the comparison. The high-speed machine with high wing loading is much more suitable to conditions in the North American Continent than in most parts of the British Empire and Europe, and is a type which would naturally tend to evolve there. It is also true that the cost of getting high speed is less than is commonly supposed and is confined mainly to the items, first cost per seat and engine maintenance cost per seat. It does, however, involve high landing speeds, flat take-off, need for good pilots, difficulty of forced landing, etc. The first necessity here is to make flying as cheap, safe and easy as possible. We should have to think many times before putting 4,750 lbs. on a 41-ft. span, say anywhere in Africa south of the Equator, where the ground is 5,000 to 6,000 ft. above sea level and it is hot.

There is always some liability of misunderstanding concerning figures. The loaded weight of the "Dragon" given is that for which the certificate was applied for, having regard to the need for flying on one engine, getting off high altitude aerodromes and out of confined spaces. At this weight it has a very large margin over the British National take-off requirement, which is more severe than any other. It has, however, been doing tests at 4,700 lb. (*i.e.*, pay load 1,740 lb.), and I see in "Aviation's" tables a maximum weight of 4,500 lb. is given for the "Vega." I do not know which is the comparative figure to take, but that of the "Dragon" will definitely be limited to 4,200 lb.

There are one or two other figures in Mr. Chappellet's comparison which might require a little adjustment, but the main question of the cost of high speed is much more interesting. There is no doubt that the method of getting high speed at the expense of high wing loading is the easiest and perhaps at the present moment the only commercially practicable way of getting it. This whole question is one of great interest, and will in the near future become still more important.

It is perhaps easier to discuss it without reference to specific types, so far as possible bias is concerned, but I see nothing of the sort in Mr. Chappellet's letter, and hope I have displayed none.

Stag Lane Aerodrome. C. C. WALKER.
February 18, 1933.

CHEAPER LIGHT PLANES

[2832] I see in the issue of FLIGHT for January 5 that Mr. Gotch wants a light plane for £300.

As it seems to be the rule these days to blame the Air Ministry regulations for the high price of the present-day light aircraft, I will not argue for or against this point.

Sir Sefton Brancker stated in the 1929 edition of the "Air Annual of the British Empire" that as a result of tests given by the 1924 light aeroplane competition to engines of 32 to 40 h.p., it was proved "that they did not give quite sufficient power for a fully-loaded two-seater," and it would seem that 40 h.p. meant just as much in power output then as it does to-day.

To the contrary notwithstanding, we have several light two-seater planes here with motors giving 30-40 h.p., which meet Mr. Gotch's requirements with regard to price, with cruising speeds of 65-70 m.p.h., 8.5 U.S. gall. gasolene capacity and a radius of 200-225 miles, which is a little short of his specification.

We also have planes costing around £300 at par with much better performances, and of course motors around 45 h.p., but I take it that the point at issue is the price and not the performance, if it can be made better than the one specified.

I cannot see what his idea of 25 h.p. is, unless to keep the price low. A plane so underpowered as this might possibly be of no use for half of the year, except to "mess around the aerodrome," and one certainly would not be able to pick up and "go places" any old day the English visibility was good. I have seen a "Gipsy Moth" in difficulties owing to head wind more than once, and I should think that for everyday flying a cruising speed of, say, 80 m.p.h. is no more than necessary.

For the benefit of those concerned, I would most assuredly like to see the price of English light planes lowered, but laymen oftentimes ask for too much when describing their conception of the "ideal" machine, each one having vastly different ideas as to what it should be for it to be ideal.

Just what is the matter with the A.B.C. "Scorpion"? It has a normal output of 35 h.p., costing £120 (provisional), and if there is such a demand for these dinky little low-powered planes, as Mr. Gotch would have us believe, why has not some designer with vision and enterprise constructed a plane of this type? The average light craft of to-day costs about two and one-half to three times the price of the motor, so the price would be right and the performance should be as good, if not better, than that asked.

WALTER J. SMITH.

London, Ont., Canada.
February 1, 1933.

UTILITY OF LONG-DISTANCE FLIGHTS

[2833] Now that the Long-Distance Record has joined other records at present in our keeping, we have a good opportunity for discussing the value of similar future flights.

Obviously everyone connected with the flight, pilots, designers and manufacturers, are to be greatly congratulated on their achievement.

The Air Ministry and its officials, in remarking on the Cape flight, seem to indicate that further flights of this sort will be made. Now, admitting the necessity for developing long-range machines, bombers, troop-carriers and mail planes especially, I have yet to be convinced that a machine, which is virtually a flying petrol tank, is helping to develop the machines enumerated above. It would seem that a machine, to be of any value, must carry a pay or service load. Surely a better purpose would be served if, instead of attempting to fly 7,000 or 8,000 miles non-stop, the machine were to carry a load of, say, 2,000 lb. for a lesser distance.

The Fairey Napier monoplane would have a pay load (assuming available space) of about 2,300 lb. if its range were reduced from 5,400 to 4,000 miles.

As a student of aeronautics, I know that when a machine has been flown and its performance curves ascertained, it is not very difficult to find its maximum load, and hence its maximum range. Once we know a machine will fly for a certain time, it is merely a question of reliability as to whether it does in fact fly for that time. There is no other factor than reliability which decides whether an engine, which will run for 10 hours, will run for 100 hours; as long as it has fuel in fact. All the necessary reliability tests can be carried out on many types of service aircraft, and not a few on the ground, thus there seems little rhyme or reason for building special aircraft for ultra-long-range work with no useful load of any sort or kind.

Much more useful would be the development of a type of machine with a reasonable range, say 4,000 miles, and a useful load of, say, 1,500 to 2,000 lb. In making my remark about the pay load of the Fairey machine being about 2,300 lb. if the range were reduced to 4,000 miles, I am well aware that all of this 2,300 lb. could not be utilised, as the drag would probably go up in converting this machine to give adequate space for the load, the range would, of course, be rather less than the 4,000 miles. But I am reasonably sure that even at this stage it is possible to carry a load of 2,000 lb. non-stop for 4,000 miles, and am convinced that it is far more worthy of attempt than flying light for 2,000 miles.

I read in to-day's *Evening Standard* that Air-Commodore Chamier is reported to have said: "We can look forward to the time when such flights as this will become ordinary service exercises in the Royal Air Force." What possible useful purpose could such flights serve? Once a flight of this type is accomplished, it should either be left alone or beaten, not just repeated. It would hardly be of any value to repeat this flight next year in order to show reliability, or to show off the organising abilities of the R.A.F., and I am afraid I cannot see any other justification for repetition even as an "ordinary service exercise."

J. A. CROSBY-WARREN.

St. John's College, Cambridge.
February 9, 1933.

CIVIL USE OF R.A.F. AERODROMES

[2834] With reference to your report on the Hanworth debate, it appears that each speaker wishes to obtain one type of machine to suit every private owner. Surely there will be a demand for every type in the same way as there is for different cars, motor cycles, sidecars and tricars, small yachts and large yachts, etc.

Although planes can never be as useful as cars, there will be a very much greater demand than there is for yachts, because private owners can use a plane for business purposes, although through lack of aerodromes this is limited at the moment; but if the Air Ministry would forego their demands, private enterprise would quickly have an aerodrome, though maybe not colossal, north, south, east and west of every fair sized town.

At present the Air Ministry allow the R.A.F. to hamper the development of aerodromes. They have numerous stations right on the top of towns which should be turned over to civil aircraft, and the R.A.F. should be better off in the country. Take Castle Bromwich, for instance, the largest and nearest aerodrome to the centre of Birmingham and right alongside the British Industries Fair, cannot be used by civil aircraft operators. Hucknall, Nottingham, the same. Halton and numerous others.

There is also no doubt that municipal authorities, owing to economy, are put off the purchase of municipal aerodromes because the Air Ministry demands entail a great deal of expenditure; surely if temporarily they were encouraged to set aside a small field suitable for small aircraft it would be better than nothing at all.

Hoping these views may be expressed,

V. N. DICKINSON.

St. Julian's Aerodrome,
St. Albans.
February 11, 1933.

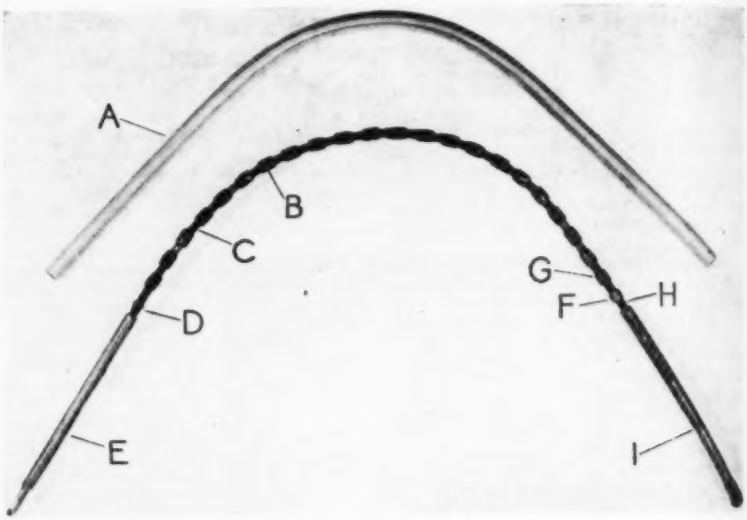
R.A.F. Long-distance Flight. Awards to the Pilots

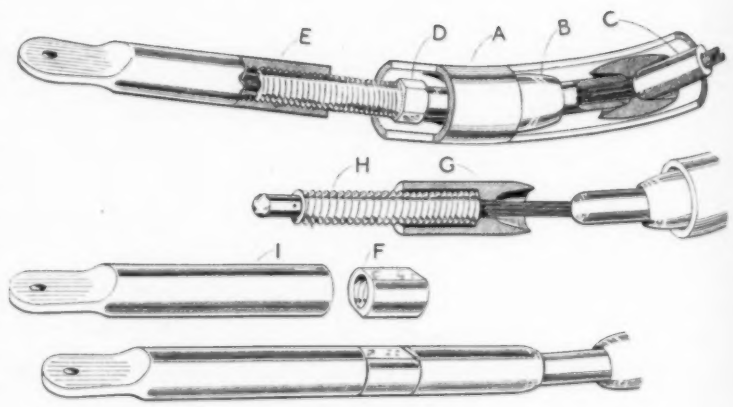
H.M. THE KING has been pleased to approve the award of the Air Force Cross to Sqd. Ldr. O. R. Gayford, D.F.C., R.A.F., and of a bar to the Air Force Cross to Flt. Lt. G. E. Nicholetts, A.F.C., R.A.F., in recognition of their services and achievement in successfully completing the non-stop flight from Cranwell to South Africa (Walvis Bay) on February 6-8, 1933. By this flight, performed in a Royal Air Force Fairey ("Napier") monoplane, these officers established a world's long-distance record of 5,340 miles on the great circle course.

The Air Ministry has received from the High Commissioner of South Africa a telegram, received by him on February 10 from the Minister of Defence, Pretoria, reading as follows:—"Convey to Air Ministry my hearty congratulations on success obtained by long-distance flight." The High Commissioner adds that he desires to associate himself with the sentiments expressed in the above telegram.

The Simmonds-Corsey Control

"PUSH-PULL" controls have been used in all kinds of machinery for centuries, and it might have been thought that by now there was no new system possible. That this is not so seems to be proved by the Simmonds-Corsey control, which has recently been introduced to the British aircraft industry and which has already gained a very considerable degree of popularity. Originated by a French engineer, the sole rights for the British Empire have been acquired by Simmonds Accessories, Ltd., the head of which is Mr. O. E. Simmonds, M.P., who will be familiar to all FLIGHT readers as the designer of the original Spartan aeroplanes. Mr. Simmonds is a practical man, and when he first came across this new type of control he at once realised its advantages. Since then a good deal of research work has been done, and official tests have been made at the Royal Aircraft Establishment at Farnborough. As a result of these, the Simmonds-Corsey control has been approved by the British Air Ministry, not only for engine controls, etc., but for the main flying controls. That there is no difficulty in using this control on even quite large aircraft is indicated by the experience with the largest unit constructed and tested so far, which was 43 ft. in length and had nine right-angle bends in it.





In fundamental principle the Simmonds-Corsey control is simplicity itself. It consists of a sort of bead chain working in a fixed tube. A stranded steel cable has threaded on it a number of metal "beads," alternatively male and female. The female beads Mr. Simmonds terms "olives," and the male beads he calls "tubelets." The olives have a hemispherical concavity at each end, and the tubelets have male hemispherical ends. A tubular metal casing surrounds the "bead chain." It will readily be seen that the olives provide the bearing surfaces against the walls of the outer casing tube, while the tubelets are merely distance pieces keeping the olives apart.

Our photograph shows a small specimen control unit, and the sketches indicate the details thereof, the reference letters being the same in both illustrations. *A* is the outer casing tube, which may be of steel, brass, aluminium alloy or any other suitable material. The olives, *B*, are always made of steel, but the tubelets, *C*, can be made of duralumin for lightness.

A plain terminal is shown at *D* and *E*. *D* is threaded externally, and is swaged on to the cable under pressure, or, for lighter work, soldered to the cable. At its inner end *D* form a seat for the first tubelet. The sliding rod *E* is screwed down against the hexagonal part of *D*. At the other end of the control is an adjustable terminal. Here an olive of special shape *G* is used, having a parallel portion at its outer end and a plain housing into which terminal *H* can slide. By turning the locking barrel *F*, the olive *G* is brought into contact with the first tubelet, and the desired cable tension obtained. The sliding rod *I* is then screwed down against *F* and the unit is in working condition. The outer tube *A* is filled with grease, and where the control is in an inaccessible position a short length of tube carries the grease nipple to the side of fuselage or surface of wing.

By unloading the sliding rod *I* and turning *F* back, sufficient space is obtained for examining the whole cable bit by bit by "bidding the beads" as on a rosary. Fraying due to rubbing is impossible, because the spacing of the olives is so chosen by selecting the length of tubelets that no sharp edge can come into contact with the cable strands. As a result of reversals tests it was found that, after a million reversals against a constant frictional load, the total axial play in a linkage consisting of 50 olives and tubelets was only 36 thousands of an inch.

A special patented oil-resisting flexible sleeve is placed over the connection between the sliding rods and the adjacent parts of the control, the interior of this sleeve being filled with lubricant from the outer casing tube. Where such sleeves are not considered necessary, a patented gland is available. This consists of a tubular body of rubber, which is slipped over the end of the outer casing tube, and carries a specially treated washer, which forms a wiper for the sliding rod and prevents dirt from entering.

For experimental work, and for the benefit of overseas users, the parts can be supplied unassembled. In that case a special tube-bending tool is supplied.

Variations of the standard Simmonds-Corsey control are also available, such as using short tubes as fairleads where the change in angle is not great, or rack and pinion attachments for heavy loads. For particulars of these, and for other information about the control, application should be made to Simmonds Accessories, Ltd., Stevenage House, Holborn Viaduct, London, E.C.1.

The Industry

Oil Cleaning

IN these days of economic necessity no ground should be let lie fallow which can be cultivated in the slightest way, and so it is interesting to see exactly what saving can be made by judicious and efficient cleaning of oil. The Fox Oil Cleaner was described in FLIGHT issue for February 12, 1932, and is probably by now well known, but the following facts as regards cost and saving should be of interest. The price of the standard plant complete varies from £16 10s. to £150, and the special plant for Diesel or aero oils complete from £35 to £170. An idea of the economy effected can be obtained from the following figures. A firm of engine manufacturers used an average of 200 gall. of lubricating oil per week in its test shops. The oil bill for the test shops was £1,500 per annum; the installation of a Fox Oil Cleaner reduced the purchases of new oil to 60 gall. a week; the firm is recovering in clean oil, from used oil, 140 gall. a week; all-in cost of reclaiming oil, £75 per annum; the bill for new oil reduced to £450 per annum; thus the total oil bill is now £525 per annum, which means a net saving of £975 per annum at a cost of plant installation of £110.

Transmitters and Receivers

Now that telephony and telegraphy are of such vital importance to aerial navigation, it is always of interest to hear about the latest improvements in this direction. The Standard Telephones & Cables, Ltd., of Columbia House, Aldwych, W.C.2, produce equipment which has been well proved in the past, and is well within the specification of perfection that is required by the British Air Ministry. The Standard aircraft radio transmitters are designed for operation on either telephony or telegraphy and are rated according to the power delivered to the aerial. The valves employed are of the highest efficiency. Constancy of wavelength is assured by a master oscillator stage, and push-pull circuits are employed for short-wave working. Deep modulation is employed for telephony ensuring the maximum speech intelligibility. Special attention has been paid to compactness and lightness without decreasing mechanical strength and simplicity of operation. Standard aircraft radio equipment has been installed on many of the very latest types of civil, military and private aircraft.

Safety First at the R.F.D. Works

IT always pays to be thorough in any job, but particularly so when dealing with the production of parachutes. The fact that the new Gregory Quilter parachutes have already been ordered by numerous countries all over the world, are being used by the Houston-Mount Everest Flight pilots, and are being fitted as standard equipment in all training aircraft used at the Brooklands School of Flying, proves that they must be considered absolutely safe. Mr. Raymond Quilter believes in leaving no stone unturned to ensure that this is the case, and as an example of his thoroughness it is interesting to find that every purchaser of one of his parachutes receives a series of prints taken from a film made with a slow-motion cinema camera during an actual test of that parachute. Thus the owner will see his own parachute opening under test and probably under far more severe circumstances than those to which he is ever likely to subject it himself. These parachutes are at present being made at the works of Mr. R. F. Dagnall, Guildford. Here are to be seen many women and girls sewing the canopy with special machines arranged to stitch two seams at once, making up the harness and all the other numerous parts, each of which is fully tested and which go to make that aerial lifebelt erroneously called a parachute. A visit to Mr. Dagnall's works discloses many other activities besides the making of this particular form of life saver, and one can only imagine from these that Mr. Dagnall must be the most humane of men. Almost everything he handles seems to have for its purpose the saving of life. We saw flotation bags of every conceivable shape and size, designed to hold up land machines used by the Fleet Air Arm, should circumstances enforce alighting on the water. Pneumatic dinghies and small boats which can be carried by seaplanes and flying-boats are used as occasion demands. His other activities include the manufacture of balloons, airship envelopes and all kinds of rope, wire, canvas and fabric work.

Cirrus-Hermes Activities

THE Rollason Aviation Co., of Ford Aerodrome, have been appointed service agents for all types of "Hermes" and "Cirrus" engines. They carry adequate stocks of spares and have well equipped workshops to carry out repairs and overhauls of all descriptions.

THE Cirrus-Hermes Engineering Co., Ltd., report that some interesting inquiries have been received by them from two foreign powers in the Far East, and they are looking forward to some good business.

A Useful Handbook

FROM Air Survey Co., Ltd., of Hayes, Middlesex, an informative notebook and pocket diary is to hand, dealing with their air survey work, which embraces contracts with the Ordnance Survey of Great Britain, and Governments of India, Egypt, Burma and other Governments, covering many remote parts of the world. Following a foreword by Sir Robert A. Hadfield is an elaborate engineer's diary, containing many tables, valuable formulæ, etc., of importance to the engineering and allied professions, besides a vast amount of general information covering an extensive field, including some eight maps in colour. Before many years have passed, no doubt, the page devoted to "Personal Memoranda" will include, besides spaces for Driving Licence No., Life Policy No., Size in Hats and what not, an open line or two for "Type of aircraft," "Registration No.," "Engine No.," and so on, will not, we think, be entirely superfluous before very long. In "get-up" the pocket book is particularly attractive.

Air-mindedness in Art

THE Royal Society for the Encouragement of Arts, Manufactures and Commerce, whose patron is His Majesty the King, is holding an annual competition in Industrial Designs. This year about £1,500 is offered in travelling scholarships and prizes. We notice with pleasure that a prize of £5-£30 is offered for an airport refreshment room. Should any of our readers be interested, they should apply to the Secretary of the Royal Society of Arts, 6, John Street, Adelphi, W.C.2.

BRITISH DOPE FOR TURKEY: As announced in "Flight" for February 2 last, Cellon, Ltd., are sending a considerable quantity of dope to Turkey. Here is some of it on its way. (FLIGHT *Photo.*)

SERVICES RUGBY

Royal Air Force *v.* Royal Navy

THE Royal Navy and Royal Marines beat the Royal Air Force at Twickenham on Saturday, February 18, by 3 goals (1 dropped), 14 points, to one try, 3 points.

It was expected by all followers of Rugby that the Navy would win this match, but it was not expected that the R.A.F. would have a lead at half time and that the Navy would be unable to score until 20 minutes from the end of the game. In fact, the fight put up by the Air Force for three-quarters of the game was so plucky and dogged that it was a thousand pities to see their defence break down completely in the last quarter. It was not, however, entirely the merits of the R.A.F. defence which kept the Navy out for so long. The latter would certainly have scored before they did if their outsides had played with better organisation. They got plenty of the ball, for in the tight scrums the Navy forwards were much the better pack, and it was rare indeed for them to fail to get the ball. Their heeling, however, was slow. The Navy half-backs were also off their game until Elliott woke up towards the end. The Navy three-quarters were anything but a well-drilled attacking line. Of last year's line they sadly missed St. Clair Ford, Lane, and Lee. Surgeon-Lieut. Benson was individually brilliant at times, and his try was the best thing in the match, but as a line they were very disorganised, and they lost several chances of scoring by kicking over the line and allowing the R.A.F. to touch down.

The confusion behind the Navy scrum was accentuated by the fine dash of the R.A.F. forwards. Though they were hopelessly beaten in the tight, they played a grand game in the loose, dribbling, rushing, and tackling the Navy outsides. It was this feature of the R.A.F. game which lent interest to a match which was for the most part an unscientific scramble ; and it was this which for the first 80 minutes of play seemed to promise victory to the R.A.F.

It is almost impossible to criticise the R.A.F. half backs and three quarters. When their forwards hardly ever gave them the ball, they naturally had next to no chances of developing an attack. Until that last fatal 20 minutes the second and third line of the Air Force were impeccable in their defence, and all grassed their men with a vigour which was refreshing to see. Tackling usually is of a high order in a Service match, and it was good on both sides on Saturday. Despite the lack of openings, Williams, the R.A.F. fly-half put in some wonderful jinking runs and some excellent kicks to touch. Leigh, Le Good, and especially Tindall, all made the most of the few opportunities which came their way. Coote was playing on the left wing, and if he ever was given an orthodox pass it escaped my notice. But if he was given no openings, he made one for himself with a vengeance, and his run from his own 25 line to score a try will not soon be forgotten by those who saw it. McKern, at full back, might have been better, and suffered by comparison with Gosling.

Though the game was unscientific it was full of incident and was quite exciting to watch. The day was bright and cold, and straw was piled up round the touchlines. The game started at 3 p.m. For the first quarter of an hour the Air Force forwards kept the game in the Navy's half, but then Elliot broke away and passed to Benson, who was tackled before he could do any damage. There was about five minutes of scrums in midfield, and then Williams got the ball, twisted his way past several Navy men, and kicked across to the left. Tindall put in a very good run and got to some 20 yards of the Navy line, and then Williams tried a drop at goal, but the ball hit a Navy man and rebounded. Again, Williams ran himself and almost got over in the left corner, but the Navy cleared with a kick to touch. At 3.30, Williams got away again and passed to George Beamish, but when he gave a pass the ball was knocked on.

The Navy then began a campaign of determined kicking to touch, and so took the ball into the R.A.F. 25. There was a scrum and as usual the Navy heeled. As usual, their passing was far from accurate. A lobbed pass was meant for Lewis, but he never got it. Coote dashed up at full speed, caught the ball, and broke clean away. No one on the Navy side had the pace to get within tackling distance. Gosling was far up, and rather on the other side of the ground. Incidentally, no R.A.F. man either got up to support Coote, who tore on alone in his glory, crossed the line and turned inwards before he had to touch down. A most spectacular try and a wonderful piece of opportunism ! If only Coote could have been given a few decent passes ! McKern missed the kick, but the sides changed over with the R.A.F. leading by 3-0.

The second half opened with a Navy attack, a foolish kick across the line, and a touch down by the R.A.F. Then the R.A.F. forwards were almost over the Navy line, but Kirkby cleared with a good run. Again, a touch down saved the R.A.F. The Navy were beginning to look dangerous, but were throwing away their chances. Their captain roared for all to hear " Navy, you *must* score." But within the next five minutes they let the R.A.F. touch down again. At 4.11 p.m., came the first Navy score. There was a scrum in the Air Force 25, and the defence was badly placed. Elliott slipped through the gap and fell over the line. Gosling kicked the goal, and the Navy led 5-3.

Then Elliott woke up and began to play brilliantly. A cross kick by him began an attack which ended in Elliott himself dropping a good goal. Navy 9-3. Seven minutes later Benson got a pass. He found himself cramped for room, so ran back behind Walsham. Dubious tactics, only to be justified by success. Benson justified himself. Gathering speed, he swerved round into the right-hand corner, outstripped the Air Force defenders, and crossed the line for a really brilliant try. Again Gosling converted, and the Navy led 14-3. If only they had taken all their chances, they would have led by very much more. As it was, an indifferent XV beat a worse one. When they come to play the Army on March 4, the Navy will not be able to afford to throw away any chances at all.

F. A. DE V. R.

The teams were :—

R.A.F.—P/O. R. N. McKern (Tangmere) ; P/O. N. H. J. Tindall (Grantham), P/O. H. J. F. Le Good (Digby), F/O. R. H. A. Leigh (Gosport), F/O. P. B. Coote (Wittering) ; L.A/C. S. Williams (Sealand), F/O. G. R. A. Elsmie (Hendon) ; Flt.-Lt. G. R. Beamish (Henlow), F/O. C. St. J. Beamish (Eastchurch), P/O. G. E. Valentine (Netheravon), P/O. C. C. House (Digby). Flt.-Lt. H. A. Constantine (Wittering), Sgt. G. R. Lewis (Upper Heyford) F/O. C. R. Davies (Hendon), A/C. G. E. Ford (Farnborough).

R.N.—Lt. C. G. Gosling (H.M.S. " Vivid ") ; Midsh. P. D. Lewis (R.N.E. College, Devonport), Sub-Lt. J. S. W. Walsham (R.N.E. College, Devonport), Surgeon-Lt. J. C. Benson (H.M.S. " Ganges "), Midsh. J. P. Kirkby (R.N.E. College, Devonport) ; Sub.-Lt. W. Elliot (H.M.S. " Effingham "), Sub-Lt. G. Webster (H.M.S. " Iron Duke ") ; Lt. N. L. Evans. (H.M.S" Iron Duke "), Ldg.-Seaman W. Paddon (H.M.S. " Queen Elizabeth "), Sub.-Lt. E. G. Nixon (R.N.E. College, Devonport), Marine C. Webb (Royal Marine Barracks, Devonport), Lt.-Cmdr. R. C. Harry (H.M.S. " Victory ") (captain), Lt. R. S. Hawkins (H.M.S. " Iron Duke "), Lt.-Cmdr. T. G. P. Crick (H.M.S. " Vivid "), and Paymaster-Midsh. K. J. Watkins (H.M.S. " Queen Elizabeth ")

THE REAL THING

This is not from last year's Royal Air Force Display, but a remarkable photograph of wild geese flying in formation over the River Ribble (Yorks-Lancs) on their way south. Note that two birds are posted on the inner extremity of each V.

THE ROYAL AIR FORCE

London Gazette, February 14, 1933

General Duties Branch

The following Pilot Officers are promoted to rank of Flying Officer :—P. E. Drew, N. A. R. Halliday, A. D. Messenger, J. O. W. Oliver, W. W. Stainthorpe, W. P. Welch, S. C. Widdows, C. W. Williams (Jan. 25) ; B. S. Nicholl (Jan. 26)

Stores Branch

The following Pilot Officers on probation are confirmed in rank and promoted to rank of Flying Officer (Jan. 8) :—E. G. Ambridge, J. H. Barnes.

Memorandum

No. 175802 Flight Cadet H. S. Browne is granted an hon. commn. as 2nd Lt. with effect from date of demobilisation.

PRINCESS MARY'S ROYAL AIR FORCE NURSING SERVICE

The following Staff Nurses are promoted to rank of Sister (Jan. 27) :—Miss K. D. Johnson, Miss K. A. Witts.

ROYAL AIR FORCE RESERVE
RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The following Flying Officers are transferred from Class A to Class C :—F. Horsley (Dec. 2, 1932) ; C. F. Wolley Dod (Lt., R.A.R.O.) (Feb. 5). C. E. F. Arthur is granted a commn. in Class A as a Flying Officer (Feb. 15).

AUXILIARY AIR FORCE

General Duties Branch

No. 604 (County of Middlesex) (Bomber) Squadron.—The following Flying Officers are promoted to rank of Flight Lieut. :—C. P. Gabriel, L. E. A. Healy (Jan. 6).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Group Captain H. J. F. Hunter, M.C., to H.Q., Fighting Area, Uxbridge, 6.2.33, for Air Staff duties, *vice* Air Commodore J. E. A. Baldwin, D.S.O., O.B.E.

Flight Lieutenants : R. C. Wilson, to No. 1 School of Tech. Training (Apprentices), Halton, 30.1.33. M. G. Philpott, to School of Naval Co-operation, Lee-on-Solent, 4.2.33. C. Walker, to No. 4 (A.C.) Sqdn., S. Farnborough, 30.1.33. R. E. Bain, to No. 43 (F.) Sqdn., Tangmere, 6.2.33. C. J. W. Hatcher, A.F.C., to Home Aircraft Depot, Henlow, 6.2.33. G. H. Harrison, D.F.C., to No. 3 Flying Training School, Grantham, 30.1.33. T. Humble, to No. 13 (A.C.) Sqdn., Netheravon, 30.1.33. W. A. Tattersall, to No. 47 (B.) Sqdn., Khartoum, 10.1.33. C. T. Walkington, to R.A.F. Depot, Middle East, Aboukir 19.1.33. A. H. Simmonds, to No. 1 School of Tech. Training (Apprentices), Halton, 7.2.33. J. L. Airey, D.F.C., to No. 1 (Indian) Group H.Q., Peshawar, 7.2.33. J. Norwood, to No. 20 (A.C.) Sqdn., Peshawar, 7.2.33. J. S. Phillips, to No. 1 (Indian Wing) Station, Kohat, 7.2.33. H. R. McL. Reid, D.F.C., to No. 5 (A.C.) Sqdn., Quetta, 7.2.33. J. Silvester, to Aircraft Depot, Karachi, 7.2.33. L. R. Stokes, to No. 39 (B.) Sqdn., Risalpur, 7.2.33. G. H. Vasse, to No. 3 (Indian) Wing H.Q., Quetta, 7.2.33. H. G. Wheeler, to No. 1 (Indian) Wing Station, Kohat, 7.2.33. W. C. Yale, to H.Q., R.A.F., India, New Delhi, 7.2.33. L. W. Dickens, to Air Ministry, Dept. of A.M.P. (D. of P.), 8.2.33. D. Macfadyen, to No. 8 (B.) Sqdn., Khormaksar, Aden, 8.2.33. R. J. Rodwell, to No. 84 (B.) Sqdn., Shaibah, Iraq, 8.2.33. E. S. Steddy, to H.Q., Aden Command, 8.2.33.

Flying Officers : G. D. Emms, to Elec. & Wireless School, Cranwell, 30.1.33. E. J. Finnegan, to School of Naval Co-operation, Lee-on-Solent, 11.1.33. A. C. Richardson, to No. 39 (B.) Sqdn., Risalpur, India, 3.1.33. W. A. J. Satchell, to School of Naval Co-operation, Lee-on-Solent, 16.12.32. H. J. Wilson, to School of Naval Co-operation, Lee-on-Solent, 16.12.32. R. V. Alexander, to Air Armament School, Eastchurch, 30.1.33. S. H. Bell, to R.A.F. Base, Gosport, 30.1.33. W. J. Crisham, to No. 28 (A.C.) Sqdn., Ambala, 7.2.33. G. L. Best, to No. 1 Armoured Car Co., Hinaidi, Iraq, 8.2.33. J. W. Burgess, to No. 203 (F.B.) Sqdn., Basrah, Iraq, 8.2.33. M. V. Gibbon, to No. 55 (B.) Sqdn., Hinaidi, Iraq, 8.2.33. R. G. Harnan, to No. 8 (B.) Sqdn., Khormaksar, Aden, 8.2.33. L. S. Lamb, to No. 70 (B.T.) Sqdn., Hinaidi, Iraq, 8.2.33. F. C. Seavill, to No. 8 (B.) Sqdn., Khormaksar, Aden, 8.2.33.

Pilot Officers : C. F. M. Rambaut, to No. 100 (B.) Sqdn., Donibristle, 6.2.33. F. C. de la P. Beresford-Peirse, to No. 27 (B.) Sqdn., Kohat, 7.2.33. C. Broughton, to Aircraft Depot, India, Karachi, 7.2.33. R. A. C. Carter, to Aircraft Depot, India, Karachi, 7.2.33. R. E. de Pentheny O'Kelly, to No. 5 (A.C.) Sqdn., Quetta, 7.2.33. T. G. L. Gale, to Aircraft Depot, India, Karachi 7.2.33. R. J. Gosnell, to No. 5 (A.C.) Sqdn., Quetta, 7.2.33. W. M. Keddie, to No. 20 (A.C.) Sqdn., Peshawar, 7.2.33. D. J. P. Lee, to Aircraft Depot, India, Karachi, 7.2.33. C. R. D. L. Lloyd, to No. 31 (A.C.) Sqdn., Quetta, 7.2.33. C. C. Morton, to No. 31 (A.C.) Sqdn., Quetta, 7.2.33. H. D. Raynham, to Aircraft Park, India, Lahore, 7.2.33. M. H. Rhys, to No. 31 (A.C.) Sqdn., Quetta, 7.2.33. T. U. Rolfe, to No. 31 (A.C.) Sqdn., Quetta, 7.2.33. W. L. Stewart, to No. 28 (A.C.) Sqdn., Ambala, 7.2.33. R. B. Young, to No. 28 (A.C.) Sqdn., Ambala, 7.2.33. R. Monks, to No. 8 (B.) Sqdn., Khormaksar, Aden, 8.2.33.

Stores Branch

Wing Commander W. J. B. Curtis, O.B.E., to Aircraft Depot, India, Karachi 7.2.33, for stores duties, *vice* Sqdn.-Ldr. E. Meynell, D.C.M.

Flight Lieutenants : G. H. Doveton, to Station H.Q., Abingdon, 3.2.33. A. J. Cox, M.B.E., to H.Q., R.A.F. India, New Delhi, 7.2.33. A. G. Stratford-Tuke, to H.Q., Aden Command, 8.2.33.

Flying Officers : W. A. Lee, to Aircraft Depot, India, Karachi, 7.2.33. J. E. V. Tyzack, to Stores and Supply Depot, Aden, 8.2.33.

Accountant Branch

Wing Commander T. H. Evans, to H.Q., R.A.F., Cranwell, 6.2.33, for duty as Command Accountant, *vice* Wing-Com. P. J. Wiseman.

Flying Officer B. Chadwell, to No. 25 (F.) Sqdn., Hawkinge, 30.1.33.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty :—

Lieut.-Commander. I. R. Grant (Flt. Lt., R.A.F.), re-attached to R.A.F. (Feb. 15) and apptd. to *Victory*, for R.A.F. Base, Gosport, for course, and to *Kent* for 403 Flight (Feb. 22).

Royal Air Force

Wing Commander J. M. Robb, D.S.O., D.F.C., to *Eagle*, as Senior Air Force officer (Feb. 12).

Flight-Lieut. A. F. James, to *Hermes* (Feb. 9).

R.A.F. College, Cranwell

The following flight cadets successfully completed, on December 16, 1932, their course of training at the Royal Air Force College. The names are arranged in alphabetical order :—

Barclay, R. A. C., Bax, A. R. G., Bradford, R. L., Bray, A. N., Brotherhood, W. R., Coulsen, L., Coventry, R. G., Davies, E. B. C. (Winner of R.M. Groves Memorial Prize), du Boulay, J. F. H., Furze, D. H., Golding, A., Hastings, M., Kite, D. S. (Winner of Air Ministry Prize for Humanistic Subjects), Knights-Whittome, R. J., Mackay, I. G., Nelson, E. D. M., Parish, M. J. O., Patmore, S. P. A., Pearson-Rogers, P. J., Pemberton, D. A., Pope, J. C. (Winner of Air Ministry Prize for Aeronautical Engineering and J. A. Chance Memorial Prize), Porter, M. K. D., Powell, A. G., Robinson, P. R., Rolph, R. V. (Winner of Sword of Honour), Salter, P. S., Seymour, P. de G. H., Stone, R. G. (Winner of the Abdy Gerrard Fellowes Memorial Prize), Talbot-Smith, R.

Air Force Artists' Association

The enquiries which have resulted from the publication of A.M.O. N.150/32, while they did not warrant the holding of a Royal Air Force Art exhibition in 1932, are considered to be sufficiently encouraging to justify the formation of an Air Force Artists' Association.

The objects of this association will be to encourage the study and practice of art in the Service, and to hold exhibitions of work executed by its members. At a later date it is proposed, if possible, to extend the association's activities to include postal criticism and instruction in art for beginners. The following are eligible to become members :—(i) Past and present personnel of the Royal Air Force (including the Special Reserve and the Auxiliary Air Force), and their wives. (ii) Personnel who served with the R.F.C. or R.N.A.S., and their wives. (iii) All ranks of the late W.R.A.F. (iv) Civilians serving under the Air Ministry, and their wives. The annual rates of subscription are as follows : Officers, ex-officers and civilians of equivalent status, and their wives, 5s. ; others, 2s. 6d. Forms of application for membership can be obtained from : Group Captain A. C. Winter, O.B.E., Royal Air Force Reception Depot, West Drayton, Middlesex.

As the holding of a successful exhibition must depend upon a sufficient number of members being enrolled, it is hoped that all those interested, whether they intend to exhibit their work or not, will join the association.

Attachment of Foreign Officers to Royal Air Force Units for Training, etc.

Lieutenant James Y. Fu, of the Chinese Military Forces, having completed his attachment to the Electrical and Wireless School, Cranwell, has proceeded to Old Sarum to undergo the course at the School of Army Co-operation which commenced on January 23, 1933. On completion of this course he will return to Cranwell to undergo the long Signals Course.

No. 1 Squadron R.F.C. and R.A.F.—Reunion Dinner

A reunion dinner of officers, past and present, of No. 1 Squadron R.F.C. and R.A.F. will take place on Friday, March 24, next at the Royal Air Force Club, 128, Piccadilly, at 8.30 p.m. Tickets will be 5*s.* 6*d.* each exclusive of wines, and may be had on application to the honorary secretary. Will any ex-member of the Squadron who has not received a notice please communicate with the Honorary Secretary, No. 1 Squadron Reunion Dinner Club, Royal Air Force, Tangmere, Chichester, Sussex.

No. 25 (Fighter) Squadron, R.A.F. Reunion Dinner Postponed

Owing to unforeseen circumstances the No. 25 (Fighter) Squadron's Reunion Dinner for all past and present officers of the Squadron has been postponed until a date to be fixed later, probably just prior to the Royal Air Force Pageant.

All Sports Exhibition

It has been decided to hold a Sports and Games Exhibition at the Royal Agricultural Hall, London, N., from June 26-July 8. All kinds of sport will be represented, including flying, which it is hoped will be the special feature of the Exhibition. The organiser is Mr. J. O. Cavenaugh Richardson, 87, Victoria Street, London, S.W.1.

AIRCRAFT COMPANIES' STOCKS AND SHARES

DURING the past month the industrial section of the Stock Exchange has been under the influence of international rather than local considerations, and on balance price movements have been slightly against holders. Partly no doubt owing to the interest aroused by the records achieved with British aircraft, there has been a good deal of business in various shares of companies operating in the aircraft and allied industries. With few exceptions, price movements have been in favour of holders this month. Imperial Airways, which show a noticeable rise from 23s. 3d. to 28s., have perhaps attracted most attention. This reflects the possibility of a larger dividend in view of the good increase in traffic in the current financial year which concludes on March 31, but a more general realisation of possibilities attaching to the company's operations was also an important factor. There has always been a disposition for the price of the shares to discount prospects a good way ahead. De Havilland have been more active, and there has been a rise on the month from 17s. to 18s. 6d. At the time of writing a favourable influence for the latter is the order received from the Iraq Air Force. Fairey Aviation, which were in good demand throughout the month, are also higher at 18s. 6d., compared with 17s. 6d. A point of interest has been a rise in the company's debentures from 110 to 112½. The view current in the City is that the company can be expected to take steps sooner or later to exercise its option to redeem this stock, or alternatively offer holders an opportunity to convert into a lower interest-bearing stock. The stock is redeemable at any time on three months' notice from the company. Handley Page preference changed hands at rather lower prices, and the quotation is 7s. at the time of writing, as against 7s. 3d. a month ago. The company has a substantial interest in Imperial Airways' shares, which, as noted above, have had a good rise this month. D. Napier are a few pence up to 4s. 3d., but the list price for the 8 per cent. preference is unchanged, although business was marked up to 14s. 3d. The market does not seem to be expecting the report, due next month, to announce a payment on the latter in respect of dividend arrears, apparently taking the view that the directors will again conserve resources. Rolls-Royce have been steady and are unchanged at 48s., assisted by the view that there are favourable prospects in this case of the dividend being maintained at 10 per cent. Brown Brothers showed a further rise this month on dividend hopes, and the various issues of S. Smith & Sons (M.A.) kept the greater part of the previous month's good rise. Vickers are little changed on balance, but the 5 per cent. tax-free preference are higher on the conversion of the 5 per cent. First Mortgage stock into 4 per cent. First Mortgage stock, as this will make for increased cover for preference dividends. Triplex Safety Glass experienced a good rise.

Name	Class	Nominal Amount of Share	Last Annual Dividend	Current Week's Quotation
		%		
Anglo-American Oil	Deb.	Stk.	5½	101
Armstrong-Siddeley Develop.	Cum. Pref.	£1	6½	20/–
Birmingham Aluminium Castg.	Ord.	£1	5	18/3
Booth (James), 1915	Ord.	£1	15	58/9
Do. do.	.. Cum. Pref.	£1	7	26/6
British Aluminium	Ord.	£1	5	25/–
Do. do.	.. Cum. Pref.	£1	6	21/10½
British Celanese	Ord.	10/–	Nil	6/6
British Oxygen	Ord.	£1	3	26/3
Do. do.	.. Cum. Pref.	£1	6½	25/7½
British Piston Ring	Ord.	£1	12½	30/–
British Thomson-Houston	.. Cum. Pref.	£1	7	28/–
Brown Brothers	Ord.	£1	10	33/9
Do. do.	.. Cum. Pref.	£1	7½	26/3
Dick (W. B.)	.. Cum. Pref.	£10	5	121/3
De Havilland Aircraft ..	Ord.	£1	2½	18/6
Dunlop Rubber	Ord.	c	Nil	21/4½
Do. do.	.."C"Cum.Pref.	16/–	10	21/6
En-Tout-Cas (Syston) ..	.. Def. Ord.	1/–	Nil	–/6
Do. do. ..	..Ptg. Pfd.Ord.	5/–	8	2/6
Fairey Aviation	Ord.	10/–	10*	18/6
Do. do. ..	..1stMt.Deb.	Stk.	8	112½
Firth (T.) & John Brown	.. Cum. Pref.	£1	6D	5/6
Do. do. ..	.. Cum. Pref.	£1	5*D	5/6
Ford Motor (England) ..	Ord.	£1	Nil	17/9
Fox (Samuel)	.. Mt. Deb.	Stk.	5	82½
Goodyear Tyre and Rubber ..	Deb.	Stk.	6½	104
Handley Page	.. Ptg. Pref.	8/–	10B	7/–
Hoffmann Manufacturing	.. Ord.	£1	Nil	15/7½
Do. do. ..	.. Cum. Pref.	£1	7½	21/3
Imperial Airways	Ord.	£1	3	28/–
Kayser, Ellison	Ord.	£5	Nil	50/–
Do. do.	.. Cum. Pref.	£5	6	70/–
Lucas (Joseph)	Ord.	£1	20	84/3
Napier (D.), & Son	Ord.	5/–	Nil	4/3
Do. do.	.. Cum. Pref.	£1	7½	21/3
Do. do.	Pref.	£1	8A	12/6
National Flying Services ..	Ord.	2/–	Nil	–/4½
Petters	Ord.	£1	Nil	8/9
Do.	Cum. Pref.	£1	7½	10/–
Roe (A. V.) (Cont. by Armstrong-Siddeley Devel, *q.v.*) ..	Ord.	£1	—	—
Rolls-Royce	Ord.	£1	10	48/–
Smith (S.) & Sons (M.A.)	.. Def. Ord.	1/–	Nil	3/6
Do. do. ..	.. Pt. Ptd.Ord.	£1	7	30/–
Do. do. ..	.. Cum. Pref.	£1	7½	23/9
Serck Radiators	Ord.	£1	12½	29/6
"Shell" Transport and Trading	Ord.	£1	7½*	45/–
Do. do.	.. Cum. Pref.	£10	5	£11½
Triplex Safety Glass	Ord.	10/–	10E	36/3
Vickers	Ord.	6/8	5	6/9
Do.	Cum. Pref.	£1	5*	20/9
Vickers Aviation (Cont. by Vickers, *q.v.*)	—	—	—	—
Westland Aircraft (Branch of Petters, *q.v.*)	—	—	—	—

* Dividend paid, tax free. C £1 unit of stock. D Last xd. March, 1931. A Last xd. September, 1931. B Last xd. July, 1932. E On shares of £1 denomination.

35 h.p., not 9 h.p.

By a printer's error in last week's issue, the power of the Green engine fitted in Bert Hinkler's Avro "Baby," on which he flew from London to Turin non-stop in 1920, was given as 9 h.p. This is, of course, wrong. The Green engine of that type was rated at 35-40 b.h.p.

The Air Force List

THE February issue of the Air Force List has now been published. It can be purchased (price 2s. 6d.) from H.M. Stationery Office at the following addresses:—Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; 2, York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square, Belfast; or through any bookseller.

Week-end Aérien

THE balance-sheet of the week-end aérien is now ready, and any subscribers who have not received a copy should apply to Mr. A. C. M. Jackaman, Highfield, Slough.

Index and Title Page to Flight

APPLICATION for the above for Vol. 25 (1932) of FLIGHT should be made without delay as the stock, owing to the big demand, is now running low and under no condition can they be reprinted. The price is 1s. 1d. post free in cylinder. All subscribers' copies were included, free, in the issue of February 4 last.

PUBLICATIONS RECEIVED

Who's Who in British Aviation, 1933. Compiled and edited by T. Stanhope Sprigg and M. G. Sedorski. Airways Publications, Ltd., 6, Norfolk Street, Strand, W.C.2. Price 6s.

Die Grundlagen der Flugsicherung. Verkehrswissenschaftlichen Instituts für Luftfahrt an der Technischen Hochschule, Stuttgart-N. R. Oldenbourg, Munich, Germany.

NEW COMPANY REGISTERED

BRITISH KLEMM AEROPLANE CO., LTD., 1, Albemarle Street, Piccadilly, W.1.—Capital £13,500 in £1 shares. Manufacturers and repairers of aeroplanes, seaplanes, flying boats and aircraft of all kinds, and the component parts thereof, etc. The subscribers (each with one share) are:—J. H. L. Musker, Rushford Hall, Thetford, Norfolk, gent, and E. F. Stephen, 1, Albemarle Street, Piccadilly, W.1, aeronautical engineer. B. F Stephen signs documents as director.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cy'. = cylinder; i.c. = internal combustion; m. = motors.

(The numbers in brackets are those under which the Specification will be printed and abridged. etc.)

Applied for in 1931

Published February 23, 1933

14,843. NAAMLOOZE VENOOTSCHAP NEDERLANDSCHE INSTRUMENTEN-COMPAGNIE "NEDINSCO." Anti-aircraft fire-control apparatus. (386,964.)

23 216. CIERVA AUTOGIRO CO., LTD. Aircraft with rotatable sustaining means. (387,020.)

24 430. ECLIPSE AVIATION CORPORATION. Engine-starting mechanism. (387,025.)

24,820. BENDIX-PERROT BRAKES, LTD., and P. E. HALL. Brake control for aircraft. (387,027.)

Applied for in 1932

Published February 23, 1933

11,290. CIERVA AUTOGIRO CO., LTD. Aircraft sustaining rotors. (387,177.)

18,894. S. SWITLIK. Parachute pack harness. (387,234.)

19,710. R. and E. MAIER. Means for repelling aerial attacks in warfare. (387,238.)

25,789. SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT, LTD., and H. P. WYLIE and P. G. CRABBE. Aerial screw propellers. (387,280.)